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UNITED STATES DEPARTMENT OF AGRICULTURE

DEPARTMENT BULLETIN No. 1207

Washington, D. C. ▼ February, 1924

DRAINAGE DISTRICT ASSESSMENTS

A STUDY OF PRESENT PRACTICES IN ASSESSING BENEFITS UNDER THE STATE DRAINAGE LAWS

By

GEORGE R. BOYD, Senior Drainage Engineer, in Collaboration with
R. A. HART, Senior Drainage Engineer
Bureau of Public Roads

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INTRODUCTION.

In organization for the construction of drainage improvements two major problems must be solved: The engineering problem of how relief can best be obtained and the problem of finance—that of assessing, collecting, and disbursing the funds required for construction. In the matter of finance the factor causing the greatest number of lawsuits with accompanying expenses and delays, and the greatest number of failures to complete the organization of proposed drainage districts, is the apportioning of costs among the several landowners. The engineer's plan of reclamation is usually accepted by

NOTE.—The writer desires to express his appreciation of the help given him by engineers and others who so kindly explained their methods of making assessments to him, and especially thanks H. S. Yohe, formerly expert on drainage organization with this bureau, who secured a part of the data and some of the legal decisions which have been used.

all concerned with but little discussion, but the apportionment of the costs is too often the cause of long and expensive litigation. It is no unusual thing for organization proceedings of drainage districts to be delayed from two to five years by appeals from the assessments, and in some districts such actions have added 25 per cent to the cost of the improvement.

Textbooks on drainage engineering do not deal with the subject of assessments in detail and, while a few excellent papers have been published by various organizations, nothing in print adequately treats the subject of drainage assessments.

The purpose of this bulletin is to present the established principles of drainage assessments so as to clarify the confusion which exists as to this matter, to show how the problem is viewed in various districts and by numerous engineers, and to recommend a system of making assessments.

This bulletin should not be taken as authority sufficient to enable a board of drainage commissioners or viewers to take any steps without the advice of the attorneys in the proceedings. In view of the fact that the various States have widely differing laws and procedure and that court decisions are sometimes changed, the statements made herein must of necessity be general. The underlying principles, however, of assessment according to benefits have now become well established.

This bulletin does not attempt to deal with city assessments for flood protection, but is limited to assessments made for bettering the drainage facilities of agricultural lands.

SUMMARY.

A special assessment is defined as a burden laid upon real estate to secure a special benefit to such property, and a general benefit to the public at large, levied and collected by either regular or special governmental agencies, limited in amount so that it may not exceed the special benefits derived, and proportional to the amount of such benefits. The power to authorize such assessments lies in the people and is exercised by them through their representatives in the legislature. The powers of the legislature are limited by constitutional provision in such a way that both public and private interests must be involved before special assessments can be levied. In other words, both general and special benefits must be shown before a drainage district can be organized.

General benefits are defined as those which are enjoyed by the public at large and which are common to all the people of the community. Special benefits are the ones upon which the assessments rest, and have been defined as whatever will increase the value of the land, either by relieving it of some burden or by making it more adaptable for the purpose for which it is used. Such special benefits must be certain, either direct or indirect, and must develop within a reasonable time. The land affected must be given full credit for all of its advantages which pertain to it, either natural, artificial, or as a matter of law. From this it follows that some things usually considered in fixing benefits, such as the fertility of the soil and the location of the property with regard to towns, railroads, or markets, should be omitted. The factors of benefit to be considered will vary

with the conditions surrounding each case, but, in general, they will include (1) the need of drainage or wetness of the land, (2) the amount of drainage or protection furnished, (3) increased healthfulness, (4) increased accessibility, (5) the use which is being made of the property. The courts have generally held that the best measure of the benefit is the increased value of the property.

The field investigations which form the basis of this bulletin showed a very evident lack of appreciation of the principles of assessments on the part of lawmakers, engineers, and assessors. Three general methods of determining assessments are in use. The first is called the percentage method, the second the classification method, and the third the "actual value of the benefits" method.

The percentage method is not required by the statutes of any State, but is extensively used in Iowa and in some other Middle Western States. According to this method, each factor that affects the physical conditions surrounding a tract and its drainage is given a separate value in percentage and from these combined percentages the relative benefit is finally determined. The equity of assessments made by this method depends wholly upon the correctness of the values assigned to the various factors and on the accuracy of the assumed effect of the several factors upon the resulting benefit. The field investigations showed that these values are arbitrarily assigned, being without foundation in fact, and that the same values are used, almost without exception, over wide areas and under widely different conditions.

The percentage method is complicated, so much so that it is confusing to both assessors and landowners. The assessors can have but a vague idea of the money significance of their acts. It does not give the landowner complete information as to the amount of his assessment until it is too late for him to object to his assessment. It never does give him an estimate of the benefits he may reasonably expect, and so deprives him of that full knowledge of the costs and benefits of the proposed improvement to which he is entitled. The investigation failed to develop any features in the percentage method that can be commended. Judging from the number of appeals from assessments which have been carried to the higher courts in States using this method (although it is admitted that this kind of comparison is not entirely accurate), assessments so determined have not given as much satisfaction as have the methods in use in other States.

The classification method is prescribed by statute in North Carolina and in several Southern States which have followed North Carolina's general drainage law. These statutes provide that the lands shall be divided for assessment into five classes, and that the ratio of assessments between the five classes shall be 5, 4, 3, 2, and 1. It is a very difficult matter to make equitable assessments by this method, as it is almost, if not entirely, impossible to divide the lands of any district into five classes so that the benefit between the classes shall be in the ratio fixed by law. This method is far too inflexible to allow the fixing of equitable assessments. Furthermore it is confusing to the viewers and gives the landowner no definite information as to the amount of his assessment and no information whatever as to his probable benefits.

The third method, which estimates the actual value of the benefits conferred and apportions the assessments accordingly, is required to

be used by the statutes of 14 States. It follows directly the theory of special benefits by determining the value of the benefits to accrue and uses the benefits as the basis for apportioning the assessments. It has been used with success under a wide variety of conditions, and while not perfect is much better than any other method now in use. It is simple and consequently readily understood, which is a great advantage when large numbers of people are to be convinced that their assessments are equitable and have been determined in a just and reasonable way. The use of this method is strongly recommended.

The benefits to be considered and the methods of procedure when lands are assessed in two districts, or in subdistricts, when reassessments are made for either maintenance or reconstruction, and where lands are in incorporated towns, are discussed at some length in this bulletin.

Assessments against railroads and highways are governed by the same principles as are those against agricultural lands, but different methods of arriving at the amount of the benefits must be used. In both cases the benefits considered should be limited to those resulting in decreased maintenance charges and increased efficiency. For railroads in general the benefits of decreased maintenance charges will be due to (1) prevention of flood damage, (2) removal of surface water from the right of way, and (3) the possibility of decreasing the number or length of trestles or bridges. In the usual case the value of the first and last of these three factors can be obtained from railroad accounts, but the value of the second benefit is not easily determined. Benefits from increased efficiency, in the case of railroads, will be due to (1) greater security due to the elimination of soft track (2) possibility of maintaining good track where before drainage only poor track could be maintained, and (3) better train service made possible by the elimination of soft track and flood conditions. These benefits are indefinite and difficult to evaluate.

Damages are usually determined by the same board which makes the assessments, but they are determined separately. The measure of the amount of damages is the difference in the value of the property before and immediately after the construction of the improvement without considering the benefits which may accrue. The most common damages suffered by agricultural lands are those due to the taking of lands for rights of way and to the cutting off of a portion of the farm from the remainder by an open ditch. The usual damages sustained by a railroad company are those due to the rebuilding of old bridges or the building of new ones, to the cost of opening the tracks to allow the construction of the improvement, and to the cost of building the improvement across the right of way, if such work is required by statute of the railroad company. In the matter of bridges, whether or not the drainage district is responsible depends upon the statute and court decisions in the several States.

ASSESSMENTS DEFINED.

Assessment is defined in Black's Law Dictionary as "The process of ascertaining and adjusting the shares respectively to be contributed by several persons toward a common beneficial object according to the benefit received." This is a general definition appli-

cable to all kinds of assessments, including those made by insurance companies and other organizations, as well as those made for local improvements. In Taxation by Assessment, by Page and Jones, the following precise definition of assessments for local improvements is found:

> A local assessment levied upon the theory of benefits may then be defined as an enforced involuntary charge, generally in money, though sometimes in the alternative in work or materials, imposed by competent political authority in order to raise funds to pay for part or all of an improvement of a public character whereby an especial local benefit has, in the contemplation of the law, been conferred upon certain property, in most cases, realty, but in some rare cases, personalty; imposed generally upon the property, but in some cases upon the owner thereof; and imposed in the contemplation of the law, in return for such special benefits, and in an amount not exceeding such special benefits, and apportioned according to the amount of such special benefits.

Confining ourselves to assessments for drainage improvements, we may define an assessment as a burden laid upon real estate to secure a special benefit thereto and a general benefit to the public, levied and collected by either regular or special governmental agencies, limited in amount, so that it may not exceed the special benefit derived, and proportional to the amount of such special benefit.

In the past a great deal of confusion has resulted from the tendency to conclude that an assessment and a tax are identical. It is true that they are similar in many respects, but in recent years there have been court decisions in most of the States interested in drainage work which establish the principle that a special assessment is not a tax in the generally accepted sense of the word as it is used in our constitutions and statutes. Since this is true, it follows that certain regulatory provisions in the Federal and State Constitutions in regard to taxes do not apply to special assessments. Almost every State constitution has placed some limitation upon the amount of taxes which may be levied in any one year, and has provided that taxes shall be uniform and levied upon an ad valorem basis, but the courts have held that these and similar provisions have no bearing on special assessments.

THE UNDERLYING PRINCIPLES OF SPECIAL ASSESSMENTS.

There is no basic principle of law which authorizes a group of persons to force an individual against his will to contribute money for his own good or for the benefit of the public. Most of those who seek to overthrow local assessments plead that such assessments are in fact the taking of private property for public use without just compensation or due process of law, and since such assessments are imposed by State enactments they are, therefore, in violation of the fourteenth amendment to the Federal Constitution. However, it was realized, early in the history of English law (and this is particularly true of drainage assessments), that the right to levy assessments for local improvements was an element of government, and it has come to be recognized that an individual consents to share in assessments for local improvements of public benefit in the same way that he consents to share in the expenses of government, in the maintenance of highways, to aid in the common defense against the public enemy, in the maintenance of order, and in the prevention of crime. The Constitution protects the individual

by insuring that he shall pay only his proper share of the total cost and that he can not be charged with any burden for the benefit of others who do not bear their share. This theory has been universally adopted by our courts, so that there can no longer be any doubt as to the constitutionality of special assessments for local improvements when made according to law. The authority to make such assessments lies with the people and is exercised by them through their representatives in the legislatures, but it is subject to the limitations placed upon legislative action by the State and Federal Constitutions.

The three principal powers of the legislature are the power of taxation, the police power, and the right of eminent domain. The power of taxation is self-explanatory; the police power has been defined as that inherent and plenary power in the State which enables it to prohibit things hurtful to the comfort, safety, and welfare of society; while the right of eminent domain is the power which the government has of taking private property for public use on making proper compensation therefor. The legislature, when it authorizes the establishment of drainage districts, gives them the right, either expressed or implied, to exercise one or more of these powers.

Some courts have held that a drainage district in making an assessment uses the power of taxation, while others hold that it is the police power which is exercised. The principal difference between these two powers as regards assessments is that under the power of taxation the assessment can not exceed the benefits conferred, while under the police power this limitation does not exist. However, the statutes of many States prohibit the levying of assessments which exceed the benefits, and the courts generally have held that an assessment in substantial excess of the benefits is void, so there is now no practical difference between these two powers as regards assessments.

In general, every district has the power of eminent domain for use in procuring rights of way and for other necessary uses in connection with the work of the district.

LIMITATION AND DISCRETIONS OF LEGISLATIVE POWER.

While the power of making assessments for local improvements is one of the functions of the legislature, there are certain limits to this power as well as certain discretions as to how it shall be exercised which are laid down in State and Federal Constitutions and in the decisions of the courts.

In the first place, the public interest must be involved before the power of the legislature can be exercised in making assessments for local improvements. The courts have generally held that the owner of land can not be assessed for its improvement unless public considerations are present. This limitation is common to all three powers of the legislature, so that a benefit to public health, welfare, or convenience must be shown before an assessment can be levied, irrespective of the decision of the courts as to which power is involved.

A further requirement is that there must be special and peculiar benefit to the private property which is to be assessed. This re-

quirement of a special benefit is the foundation of the theory of special assessments. Judge Cooley, in his work on Taxation, Chapter 20, third edition, says:

> Special assessments * * * are made upon the assumption that a portion of the community is to be specially and peculiarly benefited, in the enhancement of the value of property peculiarly situated as regards a contemplated expenditure of public funds; and, in addition to the general levy, they demand special contributions, in consideration of the special benefit, shall be made by the persons receiving it. The justice of demanding the special contribution is supposed to be evident in the fact that the persons who are to make it, while they are made to bear the cost of a public work, are at the same time to suffer no pecuniary loss thereby; their property being increased in value by the expenditure to an amount at least equal to the sum they are required to pay.

While it is the duty of the legislature to determine that both public and private benefits will result from local improvement, it has the right to delegate this determination to such other authority as it sees fit. This is the usual practice, and, in general, assessment laws authorize a specially constituted board, a court, or city or county officials to decide this matter. Every special assessment proceeding should show somewhere in its record, either by legislative declaration or by the finding of some properly constituted authority, that both of these essentials are present.

The legislature also has the power of fixing the limits of the assessment area, of constructing and paying for the improvement, of securing rights of way, etc., or it may delegate this authority to some other body, which is the usual procedure in any general improvement law.

The legislature must determine in what way local assessments shall be apportioned and it has considerable latitude in this matter. Laws have been enacted and upheld by the courts in which local assessments were based upon proportional benefits, on frontage, on valuation, and on area. The decisions of the United States Supreme Court seem to hold that the State legislatures have the right to apportion special assessments as they see fit, either by the front foot, area, valuation, proportional benefit, or any other criterion, provided the method of apportionment is just. A method may be fair under some conditions and unfair under others. In Houck *v.* Little River Drainage District, 239 U. S. 254, the Supreme Court, speaking through Justice Hughes, says:

> In view of the nature of this enterprise it is obvious that, so far as the Federal Constitution is concerned, the State might have defrayed the entire expense out of State funds raised by general taxation or it could have apportioned the burden among the counties in which the lands were situated and the improvements were to be made * * * It was equally within the power of the State to create tax districts to meet the authorized outlays. The legislature, unless restricted by the State constitution, can create such districts directly, or, as in this case, it may provide for their institution through a proceeding in the courts in which the parties interested are cited to appear and present their objections, if any. The propriety of a delegation of this sort was a question for the State alone. And with respect to the districts thus formed, whether by the legislature directly or in an appropriate proceeding under its authority, the legislature may itself fix the basis of taxation or assessment, that is, it may define the apportionment of the burden, and its action can not be assailed under the fourteenth amendment unless it is palpably arbitrary and a plain abuse. * * * Unless the exaction is a flagrant abuse, and by reason of its arbitrary character is a mere confiscation of particular property, it can not be maintained that the State has exceeded its taxing power.

It is also the province of the legislature to make sure that the rights of all parties are protected and that nothing is done without due process of law. These objects are accomplished by insuring that all interested parties are properly cited into court, by providing for hearings, judicial determination, and appeals to higher tribunals. Since the assessment of benefits is a matter which requires judicial determination, it is very necessary that proper notices, hearings, and opportunity for appeals be had in regard to this feature of the proceedings.

DRAINAGE ASSESSMENT LAWS.

All States interested in drainage improvement have passed general laws which, embodying the principles heretofore given, have been declared constitutional. Some statutes declare that the drainage of swamp or overflowed lands is a benefit to the public while others leave the determination of the public interest to the local authorities. The determination as to whether the assessed lands will be specially benefited is left to drainage commissions or to county boards of supervisors or to the courts.

All drainage laws authorize some political body, usually a drainage district, to carry out the law, but sometimes township or county authorities are designated for this purpose. Upon this body is conferred all of the power necessary to determine the boundaries of the district, to condemn rights of way, to levy and collect assessments, to construct and pay for the improvement, and to administer all of the business of the district.

Since it is the duty of the legislature to determine the method of apportioning the assessments, we find in each of the State drainage laws a statement as to the manner in which the costs shall be distributed. The majority of these laws specify that the assessments shall be apportioned according to the benefits, a method which not only seems more equitable than any other, but is in accord with the fundamental principle of special assessments.

The final requisite of a general drainage law is that it shall protect the rights of all parties and prevent anything being done without due process of law. Hence in all such laws are clauses providing that reasonable notice shall be given to all interested parties, that proper hearings shall be held on all questions involved, and that appeals may be made to higher courts when anyone feels aggrieved. The details of these provisions vary with the laws governing civil procedure in the several States, but their general purpose is to safeguard the rights of individuals.

KINDS OF PROPERTY LIABLE FOR ASSESSMENT.

Since an assessment for drainage purposes is not a tax, the exemptions from general taxation granted by constitutions and legislative enactments to certain classes of property do not apply to assessments. The general drainage laws usually specify some of the kinds of property which shall be assessed and may also provide exemptions for certain properties. Special benefits are a necessary basis for all assessments, and where the legislature exempts some properties such action is considered a legislative declaration that such properties will receive no benefits.

No assessments can be levied upon the property of the Federal Government without its consent. It is generally necessary that the legislature make a definite provision for the assessing of State property, although some courts have held that this provision is implied in the drainage laws. The authorities seem to agree that State lands, if assessed, can not be sold to enforce the payment of the assessment, but that the lien attaches to the land and can be enforced against a subsequent purchaser.

In general, it may be said that any kind of property, or property owned by any individual or corporation, may be assessed if benefited. In the several States agricultural lands, highways, irrigation canals and ditches, counties, municipalities, railroads and street railways, telephone and telegraph companies, and other corporations may be assessed when benefited. The effect of the location of the property within municipal corporations, and other drainage districts, is discussed elsewhere in this bulletin.

It is desirable that lands shall be assessed in small tracts. In many States the law requires that each 40-acre tract shall be separately assessed, while other States require that the assessments shall be made on as large tracts as possible. It is recommended that assessments be made on the smallest practicable divisions of the tract, since experience has shown that where lands are assessed in large units there is always serious trouble in dividing the amount assessed when the property is divided or parts of it sold during the life of the assessment. Legally, however, the fact that only a portion of a tract is benefited does not prevent the whole of the tract being assessed; nor does the occupation by a landowner of a part of his land and the leasing of the rest constitute a division of the land into separate tracts where the statute requires separate assessments for each tract.

Rights of way deeded to or taken by the drainage district generally can not be assessed.

Assessments are made against the property itself and not against an individual. Thus, a tenant farmer can not be assessed, but the assessment is laid on the land he farms. However, if special benefits are derived, a business, company, corporation, or municipality can be assessed, and it is not generally necessary that it own real estate within the district to be liable for assessment.

As a general rule, the arbitrary or intentional omission to assess a portion of the lands subject to assessment renders the whole assessment invalid. But an entire assessment is not void because some of the lands in the drainage district are found not to be benefited and for that reason are omitted from the assessment. It has been held that the omission of a country church did not invalidate the entire assessment. (Curtis *v.* Hopson, 127 Ark. 344; 191 S. W. 951.)

BENEFITS.

DEFINITION.

Since assessments almost universally are apportioned according to benefits received, it would be well to have clearly in mind just what a benefit is. In Bouvier's Law Dictionary we find "benefit" defined as "profit, fruit, or advantage" and this definition is the sense in

which the word is used in assessment work, except that it is understood to mean "gross benefit, or profit," that is to say, the total profit without any deduction of that portion of the cost which will be finally assessed against the property benefited. The reason that gross benefits are considered is that the assessment can not be determined until after the determination of the benefits and, as the assessments must be proportional to the benefits, it is as correct to base the assessments upon gross profits as upon net profits, and it is simpler.

The cost of an improvement has no relation to the benefit to be derived except as it affects the quality of the work done or the extent of the protection afforded. There are, however, cases where the cost, or a part thereof, may be used to compute the benefit which will arise from the work where no direct means of fixing the amount of benefit exist. Some of these cases will be treated in detail in another part of this bulletin.

KINDS OF BENEFITS.

There are two kinds of benefit resulting from local improvements—general and special. General benefits are those enjoyed by the public and common to all the people of the community. General benefits usually resulting from drainage improvements are increased healthfulness, convenience, and general prosperity. No assessments can be made on account of such benefits, but they must be apparent before an assessment district can be formed.

Special benefits are those which are peculiar to certain lands. Page and Jones in Taxation by Assessment, section 65, define the differences between general and special benefits as follows:

> General benefits are those which inure to the benefit of the entire neighborhood or locality. They are the general intangible benefits which are supposed to flow to the general public from a public improvement. Special benefits are those which inure to certain specific realty in a manner different from that in which the general neighborhood is benefited and which operate to increase the value of such realty.

Special benefits are the ones upon which the assessments to pay the cost of the improvement rest. In the case of drainage improvements as affecting a particular tract of land they have been held to include whatever will "increase its value, either by relieving it of some burden, or by making it more adapted for the purpose for which it is used." (Pritchard *v.* Woodbury Co., 129 N. W. 970.)

GENERAL BENEFITS.

The general benefits which the public receives from drainage improvements consist of one or more of the following: Public health benefits; public road benefits; public interest in the condition of the land.

The general benefit to public health from drainage of swamp and overflowed lands is universally recognized. A long series of decisions has held that a benefit to the public health is a sufficient evidence of the public interest to satisfy constitutional requirements for drainage improvements.

The pertinence of the other two elements is perhaps not so well established. It has been held that the general benefit to the public

at large in the improving of the highways by the drainage of adjacent lands is sufficient to establish the necessary public interest in the improvement, and Cooley on Taxation, chapter 20, third edition, says:

> But where any considerable tract of land, owned by different persons, is in a condition precluding cultivation, by reason of excessive moisture which drains would relieve, it may well be said that the public have such an interest in the improvement and the consequent advancement of the general interest of the locality as will justify the levy of assessments upon the owners for drainage purposes.

Speaking of the power to condemn and thus take property without the consent of the owner for the purpose of reclaiming lands by a system of drainage and making assessments for that purpose the United States Supreme Court in Fallbrook Irrigation District *v.* Bradley, 164 U. S. 163; 17 Sup. Ct. 56, says:

> The power does not rest simply upon the ground that the reclamation must be necessary for the public health. That, indeed, is one ground for interposition by the State, but not the only one. Statutes authorizing drainage of swamp lands have frequently been upheld independently of any effect upon the public health, as reasonable regulations for the general advantage of those who are treated for this purpose as owners of a common property. If it be essential or material for the prosperity of the community, and if the improvement be one in which all landowners have, to a certain extent, a common interest, and the improvement can not be accomplished without the concurrence of all or nearly all of such owners by reason of the peculiar natural condition of the tract sought to be reclaimed, then such reclamation may be made and the land rendered useful to all and at their joint expense.

SPECIAL BENEFITS.

Many special benefits may accrue from drainage improvements. Just what they will be depends on the circumstances in each case, yet they all have certain characteristics and limitations.

In the first place, it must be certain that special benefits will accrue. It is not enough that special benefits may develop. No benefits should be considered that can not be reasonably expected or that can not be defended in court by credible evidence.

A special benefit need not be direct; it may be indirect or collateral, and it need not be immediate, for a future benefit which will develop within a reasonable time may be considered.

Only special benefits due primarily to the improvement can be entertained. In practice, however, it is a common thing to find this principle violated. These failures are usually the result of neglect on the part of the assessors to give the landowner due credit for natural or artificial advantages which pertain to and are a part of his property. If a piece of land is high and well drained the owner can not be forced to pay for drainage work unless it gives him some benefit other than drainage or relieves him of a burden, for good drainage is one of the advantages which was paid for when the land was purchased. Likewise, if such advantage has been secured artificially by the construction of ditches or drains, full credit must be given the owner for the benefit derived from such works. This benefit is not the cost of such work, but the capitalized annual profit resulting from it. An interesting case is Drainage District No. 1, Pawnee Co., *v.* Chicago, Burlington & Quincy R. R. Co., 146 N. W. 1055. The defendant railroad, for the protection of its property,

dug two ditches by which the channels of the Nemaha River and Linn Creek were straightened at points within the district subsequently organized by the plaintiffs. The plaintiff district inaugurated a general system of drainage, which consisted in straightening the channels of the two streams from points above to points below the ditches dug by defendants, thereby appropriating the same and making them a part of its general system of drainage. The following is quoted from the syllabus of the case just referred to:

> That defendant is entitled to set-off, against the special benefits which it has derived from the entire scheme of drainage, that portion of such benefits as was caused by the work which it had itself done in producing those benefits; and that the rule for determining the amount of such offset is the sum which it would have cost plaintiff to dig those portions of its general drainage ditches which the defendant had previously dug.

It would seem that the rule here adopted by the court is not entirely correct, for the railroad company was entitled to offset against its benefits not the cost of the work which it did nor the cost of that work if done by the drainage district, but an amount equal to the benefit secured to its property by the work which it had done. The assessment levied by the district should have been based on benefits derived by the railroad company from the new construction only.

One tract of land may be able to secure complete drainage more readily and less expensively than another because of its loose, porous soil. Some land may require lateral drains placed close to each other, while other land with more porous soil will be equally well drained by laterals spaced farther apart. If complete drainage is to be provided by the district this soil property must be taken into consideration except where the benefits are measured by the increased value of the land, as it concerns one of the natural properties pertaining to the land.

Some statutes require that the fertility of the soil be taken into consideration on the assumption that it is of more benefit to drain rich land than poor. It seems, however, that the fertility of the soil is one of the advantages of the property for which the owner has already paid.

The above are but a few instances of cases to be found in almost every district where the principles of special benefits are not fully realized. Their rightful determination is essential to the equity of any assessment.

Elements of special benefits.—It has been held that—

> whatever will come to the land from the drain, to make it more valuable for tillage, or more desirable as a place of residence, or more valuable in the general market, should be reckoned as benefits. (Culbertson *v.* Knight, 52 N. E. 700.)

It is impossible to give a complete list of the elements of drainage benefit, as they depend on the circumstances in each particular case. The main element is that benefit which results from making the land more productive. This result may be accomplished by partial or by complete drainage, by protection from overflow, or by the provision of an outlet without actually draining the land. In some cases the benefit may result from the intercepting of seepage water from higher lands, flood channels, or irrigation ditches. Whatever

the manner of improvement, the protection furnished, or the source of the surplus waters, the increased production made possible by drainage works is usually the largest item of benefit received from drainage of agricultural lands. Of course, in computing the amount of such benefits, due consideration must be given to all of the natural and artificial advantages or disadvantages affecting the lands.

The courts have not defined all of the ways in which land may be made better for agriculture by drainage, because such benefits vary with the conditions in each case, but there are decisions which point out some benefits. The Iowa Supreme Court in Schropfer *v.* Hamilton County, 125 N. W. 992, said, in effect (following the syllabus of the case):

> That it would be necessary to lay more drains to render lands tillable, did not exempt the landowner from paying for the benefit arising from the drains laid; it not appearing that his assessments were proportionately higher than those of other landowners.

The same court in Christianson *v.* Hamilton County, 168 N. W. 114 held, in effect:

> Where a tile drain passed over the land of a party assessed for the cost and so furnished an outlet for lateral tile which was more accessible than it would have been had it not touched the premises, the drain was of some value thereto, though the blue clay covering the tile was impervious to water.

The same court in Munn *v.* Board of Supervisors, 161 Iowa 34, said in part:

> The only direct benefit to plaintiff's 40 acres is that the construction of this drain would furnish a tile outlet instead of the swale or ditch into which it now empties. This is of some advantage, depending somewhat on the lay of the land, the character of the soil, the size and grade of the main drain, and the amount of water coming into it from above. If an adequate drain, no argument is required to show that it will carry the water from the lateral more efficiently than would a ditch or swale. Moreover, the seepage back into plaintiff's land, of the water emptied at the boundary, which is unavoidable when a tile drain runs into a ditch or swale, is entirely obviated by discharging into an adequate tile drain. Besides this, there is a benefit in having the adjoining lowlands reclaimed and thereby avoiding the natural seepage of water therefrom * * * Another possible incidental benefit is the furnishing to the owner of the land to the west an outlet through which he can, by laying lateral drains, drain his lands so that the water therefrom will not overflow on plaintiff's lands. Such benefit is somewhat remote, but if appreciable is to be considered in ascertaining the benefits derivable from the establishment of the system.

The benefit to the health of the owner and his family is a special benefit, although it may differ only in degree from the health benefit enjoyed by the public at large. The Georgia Supreme Court in Crump *v.* Knox., 89 S. E. 586, said:

> It is not necessary that the land to be benefited shall itself be wet or swampy land, or subject to overflow; it need only be benefited to some degree by the construction of the proposed ditch or ditches. * * * Nor was there any error in submitting to the jury the question of the benefit to health which might result from the execution of the drainage plan as affecting lands in "Class E," as the purpose of the drainage law, as stated in the caption of the act, is "to promote the public health, convenience, and welfare."

Referring again to Culbertson *v.* Knight 152 Ind., 121, 52 N. E. 700, we read:

> Public health, public convenience, and public utility are fundamental considerations; and these, with all other subjects that affect the value of land, must be counted upon by the viewers in determining the question of benefits.

It sometimes happens that a body of high land is so surrounded by swamps and lowlands that it is difficult of access. In such cases the high land receives a substantial benefit due to the improved access resulting from the drainage of the surrounding wet lands. Likewise, when a farm is divided by a swale or swamp so that it is difficult to get from one part of the farm to the other or so that the cultivation of the land is more costly because of this division of the farm, the draining of the swale or swamp will remove these difficulties and the courts have held that this fact should be considered as a part of the benefit due to drainage. The Missouri Supreme Court said in regard to Mingo Drainage District, 267 Mo. 284:

> It may well be that the drainage of low, wet, and swampy lands lying about, around or near high hill land will so far benefit the latter in matters of sanitation and ease of egress and ingress as to render it entirely equitable that the hill land should bear a modicum of the cost of draining the lowland.

But where lands in the vicinity of a drainage district have increased in value, as a result of the increased values in the drainage district due to the improvement, the increased value is a general and not a special benefit, unless the lands receive some benefit either direct or indirect from the drainage. Such a condition is found in Shaw *v.* Board of Commissioners, 70 Sou. 910.

The laws of surface waters affecting special benefits.—Since all lands needing drainage are to some extent affected by surface waters, it is necessary to know just what rights appertain to the land with regard to the water which flows upon it. From a legal standpoint there are two kinds of water upon land, natural watercourses and surface waters. A watercourse is a stream flowing in a definite channel, having a bed and banks, which generally discharges itself into another stream or body of water. While the flow need not be continuous, but may altogether cease at times, it must be more than surface drainage occasioned by unusual rains or other causes. A ravine or depression through which surface drainage flows is not a watercourse.

Surface waters are those falling as rain or snow which diffuse themselves over the ground, which follow no definite channel with banks, and gather into no more definite body of water than a bog, swamp, or marsh.

There is a question as to whether flood or overflow waters outside of the stream channel should be considered a part of the watercourse or as surface waters. The generally accepted opinion is that if flood water flows in the general direction of the stream, although outside the banks, or if it leaves the main current to return later, it is a watercourse. On the other hand, if it leaves the main current never to return and spreads over the ground, it becomes surface water. Surface waters, when they find their way into ponds, creeks, or, in some States, artificial ditches, are no longer surface waters. It has been held that water seeping through a levee becomes surface water.

The rule of law in regard to a watercourse is that the waters of such a stream are not to be obstructed, impeded, or turned aside except upon the condition that the person so doing shall respond in damages for all injuries sustained. It has been held that a riparian owner has the right to protect his own land from overflow by building an embankment or levee upon it, but in so doing he must have

due regard for the rights of others. He would be answerable for damages if in an ordinary flood his works should change the course of the stream or cause the water to rise on or over other land.

There are two contradictory rules in operation in different States in regard to surface waters. One is the civil-law rule and the other the common-enemy rule.

The civil-law rule is that as between the owners of higher and lower ground the upper proprietor has an easement to have surface water flow naturally from his land onto the land of the lower proprietor, which is subject to a corresponding servitude, and hence the lower proprietor has not the right to obstruct its flow and cast the water back upon the land above. The courts in the States which follow this rule have held that the upper proprietor has the right to collect surface water in ditches or underground drains discharging into natural depressions, thus accelerating the flow and increasing the volume of the water emptying upon the land of the lower proprietor so long as the water is not diverted from its natural direction of flow.

The relevancy of this rule to drainage assessments lies in the fact that it defines one natural advantage appurtenant to land. Under this rule high land can not be assessed for the drainage of lower land made necessary by reason of the waters coming from the high land.

In the States following this rule many decisions have been made similar to the following in Commissioners of Sangamon and Drummer Drainage District *v.* Houston, Ill., June, 1918, 120 N. E. 253 (quoting the syllabus):

> The mere fact that the flow of water in a natural watercourse into which tile drains empty has been accelerated is not sufficient proof of benefits to the lands drained by the tile to warrant the annexation of such lands to a drainage district, but it must further appear that the lands, when adapted only for agricultural purposes, have been thereby rendered more productive and consequently more valuable. The owners of dominant lands which in the course of nature cast waters upon the servient lands can not be compelled to contribute to the expense of a drainage district for the draining of waters thrown on the servient lands.

The civil-law rule is followed by the States of Alabama, California, Georgia, Illinois, Iowa, Kentucky, Louisiana, Maryland, Michigan, North Carolina, Ohio, Pennsylvania, and Texas.

The common-enemy rule, or, as it is sometimes called, the common-law rule, is to the effect that surface water is a common enemy, that a landowner may lawfully protect his land from water flowing from a higher estate upon it, and therefore the higher proprietor has no easement enabling him to drain his surface water upon lower land. This rule was laid down in some early Massachusetts decisions, such as Luther *v.* Winnismet County, 9 Mass. 171, in which it was held that one landowner can not claim a right of drainage or flow of water from his land to and through the land of another It was held in Rathke *v.* Gardner, 134 Mass. 15, that a property owner has no right to collect surface water into an artificial channel and cast it upon the land of an adjoining proprietor unless an easement has been secured. The rule, however, has been so modified by the courts which follow it that drainage upon other lower land is lawful provided no serious injury is done. The Minnesota Supreme Court in Sheehan *v.* Flynn,

59 Minn. 436, said, in quoting from the case of O'Brien *v.* City of St. Paul, 25 Minn. 335, at page 336:

> Although we are not prepared to say that in no case can an owner lawfully improve his land in such a way as to cause the surface waters to flow off in streams upon the land of another, we do not hesitate to say that he may not turn the water in destructive currents upon the adjoining lands.

Later, in the same opinion, the court said:

> It gives each man the common-law right to improve and enjoy his own property to its fullest extent, but limited by the requirement that he use reasonable care in disposing of surface water, which the common law did not always require him to do.

As illustrating the attitude of the courts in the States following the common-enemy rule the following extract from the case of Lipes *v.* Hand, 1 N. E. 871, 104 Ind. 503, is given:

> Where the construction of a large ditch enables property owners to carry their lateral ditches into it, and to thus secure good drainage without encroaching on the rights of others, there is a special benefit. This results from the rule that one landowner has no right to collect water in a body and pour it upon the land of another. Where a landowner obtains an outlet for lateral ditches constructed for the drainage of his land by means of a large ditch or by reason of the widening, deepening, and straightening of a natural stream, he receives a special benefit, for he is thus provided with means of drainage without injury to others. * * * It may possibly be true that the appellants, under the existing condition of affairs, could lead their lateral ditches into the swamps and ponds without appreciable injury to their owners; but as soon as these swamps and ponds are drained, as they will be by the contemplated improvement, the appellants would no longer have the right to lead their ditches to the land reclaimed, since this would be to collect water in artificial channels and pour it upon the lands of others to their injury, and this the appellants have no right to do.

The States following the common-enemy rule are Arkansas, Connecticut, Indiana, Kansas, Maine, Massachusetts, Minnesota, Missouri, Nebraska, New Hampshire, New Jersey, New Mexico, New York, Oklahoma, South Carolina, Virginia, Washington, and Wisconsin.

The effects of these two rules on drainage work can be shown by comparing the methods used in Ohio and Indiana. Ohio follows the civil-law rule, and consequently in that State the boundaries of drainage districts are usually limited to land where the rate of flow of the drainage water will be accelerated by the improvement. No assessments can be made on lands lying above that point. Indiana follows the common-enemy rule, and in that State the district boundaries generally include all lands within the watershed and must include all lands which have artificial drainage, although such lands be many feet above the bottoms where the ditch is. Under the Indiana decisions such high lands are under the burden of taking care of the surface water which may be artificially drained from them. When a ditch is constructed to carry such waters the burden is assumed by the drainage districts; hence, the high lands are benefited to the extent of that burden and can be assessed therefor.

Under the common-enemy rule high lands do not have as great an advantage, and lower lands have not the same burden as under the civil-law rule.

Factors of special benefits.—Since the measure of the benefit derived from drainage is the increase in the value of the land, due solely to the improvement, all factors which might affect the value of the

land must be considered. The following general factors, at least, should be considered:

The need for drainage or the wetness of the land.
The amount of drainage or protection furnished.
Increased healthfulness.
Increased accessibility.
The use made of the property.

The need for drainage, or the wetness of the land as this factor is called in some statutes, is the most important factor of benefit, for it includes many things and varies greatly with conditions. The amount of benefit usually increases with the wetness of the land or the frequency of the occurrence of flood water. These in turn are dependent upon the relative elevation of the land, the size, shape, and slope of the tributary watershed, the nature of the soil, the rainfall, the temperature and humidity, the flora, and many other features. Because of the variety of physical conditions which affect the need for drainage many degrees of wetness are to be found, and since these conditions vary not only from one district to another but from one parcel of land to another it is impossible to establish a standard of the relative benefit to be expected by land arbitrarily designated as swamp, wet, or low. These varying conditions also make the averaging of the benefits over a district a matter of great difficulty, so much so that it is almost impossible to get a true average except in small and uniform districts. In considering this factor, due allowance must be made for all the advantages, either natural or artificial, which the land may possess and for any burden which the governing rule for surface waters may place upon it.

The amount of drainage or protection furnished is a factor which can be subdivided into the completeness of the drainage furnished, proximity to the outlet furnished, and the sufficiency of the outlet.

In overflow districts the improvement is seldom large enough to take care of all the water at times of extreme flood. It is generally more economical to permit the lands to be flooded occasionally than to provide complete protection against unusual floods. Where there is danger to human life in such overflows nothing less than maximum protection is justifiable. Few open ditches or tile drainage systems are built sufficiently large to care for a maximum flood; yet assessors rarely consider the effect of floods. When such floods occur property in the district will not all be affected in the same manner nor to the same extent, so it is very necessary in making assessments to consider what the improvement will do. Drainage engineers are now able to predict the probable size and frequency of future floods in nearly all sections of the country, so there is no longer excuse for neglect to consider this element.

Many drainage districts are planned to provide an outlet only, leaving the owner to install tile drains or whatever may be necessary to give complete drainage; other districts give complete drainage to all or to a part of the land.

The proximity of lands to the ditch or drain is a factor which is often improperly evaluated. The disadvantage of being at a distance from the drain must be compensated for by more than the money cost of the connecting drain. The cost of a connecting drain depends on the distance from the tract to the drain, on the quantity

of water to be carried, on the fall and on the kind of drain it is advisable to construct. The disadvantage thus varies with each tract and, therefore, must be separately determined. In many districts this disadvantage is measured by the distance of the land from the drain, eliminating other factors, though they are in many cases fully as important. Allowance for this disadvantage in terms of the cost of the district drain, as is often made, is incorrect, since the disadvantage is in no way affected by the cost of the district improvement.

It is not always possible to obtain a sufficient outlet for a drainage system, so that the quality of the outlet becomes an important factor in estimating the benefits. Usually only land near the lower end of the district is affected by a poor outlet, and as the engineer can estimate the extent and frequency of flooding, a corresponding reduction should be made in the benefit of the affected land.

The matter of health as a special benefit is too often neglected, for although such benefits may be general to the community, they are also special benefits to those who live in the immediate vicinity of the improvement.

The factor of increased accessibility applies to lands rendered more easy of access by the drainage of adjacent wet lands. Such lands need not be entirely surrounded by swamps; a common example of such a benefit is that which ensues from the drainage of a swale or wet ground which previously has separated one part of a farm from another.

Property should be assessed according to use which is made of it, or to which it is reasonably adapted. The benefits due to drainage are different in kind and amount for agricultural lands and for lands used for highways, railroads, residence or factory sites. The drainage benefits to be considered are those which will result when the land shall be used for that purpose for which it is most valuable.

There are other factors which might be included in the above list, but their application is not general enough to warrant inclusion in a general statement. Many of these are correctly used at times and under other conditions should be omitted. One such factor is soil fertility. This should be used with great care; the prevailing tendency is to give it too much weight. Rich, undrained land has a greater value than poor, undrained land. The greater return made by rich lands when drained is due the owner for his more valuable property, and is not due to drainage improvement. This factor should be omitted from consideration except where it is considered as affecting both the drained and undrained value of the land, but where costs of the work are apportioned according to an arbitrary scale it should probably be used, since some soils which are of little worth either before or after drainage might be assessed too heavily were this factor omitted.

The drainage properties of soils should be considered whenever there is marked variation in these qualities throughout the district. The width of the strip of land drained by a ditch or tile drain depends largely on the porosity of the soil. When a drain crosses a tract having porous soil the land on each side of the drain will be completely drained possibly for one or two hundred feet. On another tract with impervious soil the land may not be drained more than a few feet back from the drain. It might appear that the bene-

fits resulting in the porous soil would greatly exceed those derived on the second tract, providing the lands were otherwise equally valuable; but, as each tract must be given credit for all of its natural advantages, such a conclusion is not correct. The porosity of the soil is one of those properties which go with the land. Where an extraordinary lump-sum assessment is placed on lands crossed by tile drains on account of direct drainage the assessment should be the same per linear foot for all kinds of soil, and this amount should be determined by the benefit received by the most impervious soil in the district.

A factor called "condition of the land" is sometimes correctly used in estimating benefits. If land is in timber the full benefit of drainage can not be secured until after the timber has been cut, the stumps removed, and the land put in shape for cultivation. This work may require four or five years for completion. In other cases lands are so gullied and washed that considerable time and labor are required before full benefit from the drainage improvement can be secured. Where the benefits are determined as being the increased value of the land, this factor affects both the drained and undrained values so it has no effect upon the amount of benefit. Where the assessments are determined by other methods it is only just to make allowances for the time lost as other more fortunate lands will begin to receive benefits as soon as the drainage is under way. Care must be exercised that this allowance is not so large as to penalize the landowner who by a larger original investment or by improving his own lands has them in shape to secure immediate returns.

The distance of the tract from the district outlet should be considered when the land is so situated that it is possible to secure an independent outlet for its drainage. Such a case is exceptional, and, when it is found, the assessment should be no larger than the cost to the owner of utilizing the independent outlet. The theory that the benefit increases with the distance of the land from the district outlet can be applied only in States following the common-enemy rule for surface waters, as it does not apply in States which follow the civil-law rule.

Another factor which is sometimes considered is the situation of the land with reference to roads, railroad stations, markets, and cities; but since the property owner has paid for advantages of location this factor should be entirely omitted.

Application of special benefits to irrigated districts.—Precipitation is generally very light, often negligible from the drainage standpoint, in districts where irrigation is practiced. Problems concerning overflow are almost never encountered in irrigated drainage districts. Drainage design has little to do with surface water. These facts serve to indicate that the situation is somewhat different from that in eastern districts where such factors are of prime importance. It does not follow, however, that the basic principles relating to assessments fail to apply.

The artificial application of water to land in irrigation gives rise to unusual conditions as regards drainage. Lands that naturally never have been moistened beyond the first few feet in depth are supplied with such copious quantities of irrigation water that not only is the soil thoroughly saturated but percolation beyond the root zone takes place, resulting eventually in a rise of the ground-water table in many cases nearly or quite to the surface.

The ground-water table is by no means horizontal, but is more nearly parallel to the ground surface throughout the irrigated area. As a result of this condition two important phenomena occur: First, there is a well-defined lateral movement down slopes; second, the application of water to higher land results almost immediately in a rise of the ground water down the slope, often for considerable distances, due to hydrostatic readjustment.

A rise of the ground-water table does not come alone from the application of irrigation water to the particular tract involved but also from seepage from canals and ditches, both within and without the area, and seepage from the irrigation of higher lands.

The injury from a high water table is not confined to low-lying lands but in most cases it becomes more or less general throughout a given district. The higher lands often show injury first, and in many instances injury is most pronounced on the higher lands, particularly if they are situated at the foot of sharper slopes on which are leaky canals, or are adjacent to still higher irrigated lands.

It is manifest that the need for drainage is brought about by the artificial introduction of water into the area involved, and since this introduction is effected for the common good the factor of common responsibility is introduced. Relief from such responsibility is one of the factors of special benefit in an irrigated district and may be considered in the assessment of benefits to lands and to irrigation canals passing through or by the district and sharing in the responsibility.

Another important difference between humid and arid projects is that in the case of the former conditions are stable, so that with a given precipitation or given river stage certain lands require definite protection or improvement; while in the case of the latter, conditions are variable and injury is more or less progressive, involving more acreage as the years pass and becoming more and more serious. Protection against possible future injury is therefore an important consideration in the assessment of benefits in an irrigated drainage district.

The need for actual reclamation of the lands rendered more or less unproductive because of water-logging or the accumulation of salts is, of course, the prime and by far the most important factor of special benefit.

The amount of drainage furnished does not have so important a bearing as in humid districts where either outlet systems or complete systems may be installed. Under conditions obtaining in the arid section outlet drainage systems are not feasible, and it is the business of drainage districts to install complete systems. As a rule all lands in a district receive full drainage, the usual exceptions being lands lying too low to be afforded full drainage depth or lands already naturally or artificially drained or partly drained.

Measure of special benefits.—The courts have almost universally held that the measure of the benefit received by agricultural land from drainage improvements is the increased value of the land. This principle has been announced by many courts. Judge Cooley on Taxation, page 1254, third edition, says:

> It has been said that, in assessing benefits, the only safe and practicable course, and the one which will do equal justice to all parties, is to consider what will be the influence of the proposed improvement on the market value of

the property: what the property is now fairly worth in the market, and what will be its value when the improvement is made.

In Riverdale Reclamation District No. 805, *v.* Shimmin et al., 141 Pac. 1070, the court quotes with approval the rule contended for by the appellants, as follows:

> Undoubtedly the simplest, fairest, and most just rule and one which conforms to the underlying theory of local assessments is that the existence and amount of special benefits is to be determined by the effect of the improvement upon the market value of the property which it is claimed is benefited by such improvement. If the construction of such improvement increases the market value of such property, such property receives a benefit, and the amount of such benefit is measured by the amount of such increase.

The court said further:

> Of course the consideration of market value is a matter largely of opinion, as is the question of benefits; but it is impossible to determine the latter apart from the former, and no better test can be suggested or applied to the problem than the increased price that the land would probably bring in the market after the improvement is completed. Indeed, bearing in mind the fact that the benefit to the land is to be estimated by a pecuniary standard, it seems hard to conceive how any conclusion could be reached, without considering the probable increase in the market value. The proper course is manifestly as we have suggested; the commissioners applying their own knowledge of values, and supplementing this, if necessary, by information obtained from others. Substantially this course should be adopted, although there may be no conscious recognition of each definite step in the process.

This principle holds equally well in irrigated drainage districts with respect to lands in need of actual reclamation and also covers the factor of responsibility, since responsibility is an element of predrainage value and relief from such responsibility is an element of the increased value due to drainage.

In the case of lands requiring protection only, the measure of the benefit is the amount of loss prevented by the drainage.

THE RELATION BETWEEN BENEFITS AND ASSESSMENTS.

Almost all of the State drainage laws provide that the assessments shall be proportional to the benefits; that is to say, the assessment on each tract of land shall bear the same ratio to the individual benefits as the total cost bears to the total benefits. As a general thing the State drainage laws provide that no improvement may be made unless the prospective benefits exceed the costs. Likewise, individual benefits must exceed individual assessments, for the courts generally agree that every assessment which exceeds in amount the value of the benefits, actual or potential, is void to the extent of such excess. The United States Supreme Court in Norwood *v.* Baker, 172 U. S. 269, has held that assessment in substantial excess of the special benefits is a taking of private property for public use without compensation.

METHODS OF APPORTIONMENT.

Practice with regard to methods of apportionment diverges into two distinct lines. In one group of States the method is to evaluate the benefits received by the several tracts in dollars and cents and apportion costs according to the respective benefits. The practice in the second group does not determine directly the value of the individual or total benefits, but estimates the separate factors in percentages or

other indefinite quantities, arriving at the benefit received by each tract by analysis, and apportions the costs according to its relative benefits.

The first method directly apportions costs according to benefits. Since the measure of the benefit is the increased value of the land, the logical step is to determine this increase and apportion the costs according to the total amount of benefit. The process of determining the present and the improved values of the land, though requiring the exercise of judgment on the part of the commissioners, is simple and is easily understood, which is a great advantage when dealing with numbers of people. This method will take care of all the factors which affect the amount of benefit. Though it is difficult to estimate the various factors of benefit in either money or percentages, it is comparatively easy to determine their combined effect upon the value of the property. In the case of drainage benefits the problem of fixing the improved value is easier than in the case of benefits due to pavements and sewers, as the value of land after drainage is comparable to the value of high or drained lands in the vicinity.

In States where the benefits are not evaluated in dollars and cents, there are many systems in use for determining the relative benefits. The idea behind all is that, since the benefit varies with the physical properties of each tract, such properties or factors should be separately considered and evaluated. Advocates of such systems argue that the result is much more likely to be correct, but they are objectionable because, by their indefiniteness, they are confusing both to the assessing board and to the public and also because injustice is bound to result unless true values are placed upon the various factors.

The position of the courts is that, though the method of reckoning the increased value of the land is better, they will not prohibit the use of some other method so long as it seems fair and is not in conflict with the statute. The courts are concerned with the amount of the assessment rather than with the means used to arrive at that amount. The report of the assessors is looked upon in the same way as the verdict of a jury. Some courts say that the provisions of the statute in regard to the methods to be used are advisory only. So long as the assessment is not unreasonable the courts will not question the methods used by the assessors. However, except under exceptional circumstances, and then only upon the advice of counsel, the assessors should follow the wording as well as the spirit of the statutory provisions.

THE BOARD OF ASSESSORS AND ITS DUTIES.

The drainage laws of each State specify who shall appoint or elect the board whose duty it is to make the assessments. As a general thing this board is composed of three members, appointed by the court or by the county supervisors. In some States it is provided that all of the board members shall be disinterested parties; in other States ownership of property or relationship to landowners within the proposed district is not a bar to service on this board. As far as can be judged from a rather wide investigation, there is no advantage in having strictly disinterested assessors, as men selected for such work are generally above allowing personal interest to influence their

decisions, and their intimate and specific knowledge of local conditions is a great asset.

In some States it is required that the engineer who plans the improvement shall be a member, whereas in others, though not a member of the board, he is required to advise it in making the assessments. The engineer is a very useful member on such a board because of his knowledge of the plan of improvement and its effects and because of the intimate knowledge he has gained of the district in his work of making surveys.

The first requisite of an assessor is good judgment. The judgment of the viewers is the largest factor, and any system except the most arbitrary can be used to secure a just assessment if good judgment is exercised. In addition to this fundamental quality a good viewer must have thorough knowledge of the lands in the district, of the plan of improvement, and of the theory and practice of making assessments. Knowledge of the land must include a knowledge of its need of drainage, of the natural, artificial, and legal advantages which it enjoys, and of values of lands, both drained and undrained. Knowledge of the improvement is a necessity for the viewer, and he should inform himself of its limitations as well as its capabilities. The effect of complete or partial drainage upon the various types of land in the district should be studied. Under some methods of making assessments the viewers should have a good idea of the costs of various parts of the work.

Viewers must understand the assessment law under which they are working and know the decisions of courts in their State concerning drainage assessments. The attorney for the drainage district will give information along this line, and such information should be secured before the assessments are made instead of at the trial of some disputed assessment.

There is no unanimity in the several drainage laws as to the time for making assessments. In the majority of States it is provided that they shall be made before the construction work begins. This is the best practice, for it not only enables landowners to know approximately what their assessments will be before it is too late to object to the organization of the district, but it enables the district to secure funds at the earliest possible date; furthermore, it enables assessors to get a clearer idea of the need for drainage than is possible after construction has begun. Sometimes land appears at a disadvantage during construction, especially in the case of floating-dredge work, while landowners have been known to take advantage of delay in making assessments to improve the appearance of their lands for the purpose of deceiving the viewers.

Complaints are sometimes made that assessors make their jobs last too long. In general it may be said that all the time spent by assessors in going over lands examining them from different points and under different conditions, or even on trips to adjacent districts, should be cheerfully paid for by the district, for such money ordinarily is well spent. A full knowledge of the lands in the district and the benefits to be expected from drainage will usually result in assessments which will not be subjected to expensive court actions.

Careful record should be kept by each assessor of all facts in regard to each tract of land and its assessment. This can be con-

veniently done, in the part of the country that is sectionized, in a notebook with a quarter section on one page while the opposite page is left blank for notes. Notes should be made in the field in a form that anyone can understand and as complete and detailed as possible.

Assessors can do a great deal to insure the success of the project by freely giving information to all interested parties as to methods used in making the assessments and the considerations which determine their amounts. It probably is unwise to give out the amount of any assessment until all have been determined, but landowners should be informed by the report of the commissioners or other means of the probable amounts of their assessments as soon as practicable. Those who make inquiries or are interested in the matter should receive all possible information as to why their assessments were fixed at the published amounts. There is more dissatisfaction and litigation over drainage assessments than over other local improvement assessments. This dissatisfaction can be largely overcome by showing that the assessments were apportioned on a reasonable and equitable basis. Appeals from drainage assessments are expensive for both landowner and drainage district. The time to stop lawsuits is before the hearings; but this can not be done by reducing individual assessments until all the landowners are satisfied. The best method of preventing litigation is a clear showing that the assessments have been impartially determined on a reasonable plan.

The actual apportioning of the benefits does not complete the work of the assessors. The results must be put in an assessment roll, as provided in the statute, and this roll must be filed with the proper authorities. In the preparation of the assessment roll care must be taken to comply in every detail with the requirements of the statute. The descriptions of property should not be slighted. The usual requirement is that these shall be of such clearness as to identify the property. Care must be taken that no lands are omitted, that the correct names and initials are used, and that names are correctly spelled. Assessment rolls must be correct in every detail, for they have been attacked on seemingly insignificant grounds, such as the dollar mark omitted from the head of a column. Attention to details in preparing the assessment roll may save legal expenses and prevent vexatious delays.

ADDITIONAL ASSESSMENTS.

The laws of many States provide that when more money is required to complete the work as originally approved, further assessments can be laid on all the lands on the same basis as the first one, after proper authority is obtained. The limitation in this matter is that the total of all the assessments can not exceed the benefits as determined in the original proceedings.

The justice of making a new assessment on the same basis as the original assessment is clear. Suppose a district were organized to construct a drain 6 miles long, but the original assessment proved sufficient to pay for only 4 miles; in the second assessment should land along the completed part be exempted? It is obvious that the whole district must furnish the money to complete the work on the apportionment basis used in making the original assessment.

It is generally unnecessary to give notice of the levy of such assessments. It has been held that where a party has once been

properly brought into court, in a proceeding of this nature, he is bound to keep informed of the steps taken. A further reason is that such notice would not avail the landowner anything. Every question upon which he has a right to be heard has already been decided, so that he can not be injured, nor is his presence necessary when the amount of the new assessment is determined. This is a general rule, subject to modification according to the procedure in the various States.

REASSESSMENT OF BENEFITS.

Since the assessment of benefits usually is made before the improvement is completed, errors of judgment as to the effect of the improvement may creep in to such an extent that a revision of the benefits is necessary in order to render justice to all. In other cases, the benefits as originally estimated have proven to be too low, and a revision is necessary in order to secure more funds for construction or maintenance. To remedy such conditions some States provide for a reassessment of benefits. For instance, the Wisconsin drainage law, chapter 557, Laws of 1919, provides that at any time after the expiration of five years from the confirmation of the report of the commissioners, upon petition of the owners of at least one-tenth of the lands in the district, the court shall direct the commissioners to reassess the benefits. In case the court approves the reassessment, all payments thereafter made, for original construction or repair, shall be on the basis of the benefits as reassessed.

Such reassessments should be undertaken only in cases of extreme necessity. In a number of States, especially in the West, the outstanding bonds are a lien upon the assessments of benefits and any interference with the security behind the bonds is a very serious matter, while to keep the aggregate amount of benefits constant and to redistribute such aggregate among the landowners would be to depart from the theory that the measure of benefits is the increased land value.

MAINTENANCE ASSESSMENTS.

A drainage improvement usually begins to deteriorate before it is completed and from that time maintenance requires attention and expenditure of funds. In many States the law provides that a sum sufficient to pay maintenance charges for a short period shall be included in the original assessments. In others provision is made for levying annual maintenance assessments on the basis of the original assessments. In still other States no provision is made for maintenance.

The secret of economical maintenance lies in continuous work. If the ditch or other improvement is patrolled and the small troubles taken care of as they develop, there will never be a necessity for large expenditures. Hence, some system which places a maintenance fund in the hands of the authorities annually gives the best results. It would be well so to amend drainage statutes as to make maintenance obligatory with a penalty for nonperformance.

Assessments for maintenance charges are generally on the basis of the original assessment, but it is allowable generally to assess lands not included in the original district if these be benefited by the maintenance work. In flat areas branch ditches and laterals

are often led into the main ditch from lands which were not included in the original district, and such lands as receive a benefit from the maintenance of the main ditch can be assessed in proportion to that benefit. New railroads or highways the construction of which may have been made possible by the drainage may receive a benefit from its maintenance. On the other hand, lands originally assessed for the construction of the drain may cease to be benefited and, therefore, become exempt from assessments for repairs or liable in a reduced ratio.

It is generally held that the proceeds from a maintenance assessment must be used solely for that purpose and not to widen, deepen, or to add to the original drain.

As a general rule assessments for maintenance should be made before any indebtedness for such work is contracted.

The proper maintenance of a public drain is, in most cases, quite as necessary as its original construction. The power to assess for that purpose continues as long as the drain exists and is of public benefit, and it may be exercised from time to time as conditions require.

ASSESSMENT SUBDISTRICTS.

Physical conditions and topographical features frequently are so different in different parts of a district as to make it advisable to divide it into subdistricts for the purpose of making assessments. For instance one lateral may serve a broad area, another a narrow valley, making a big difference in the average costs per acre. Again, some lands may be so low that an extra depth of ditch is required to drain them. Rock ledges may make the work much more expensive in one part of the district than in others. Neither engineering nor legal authorities are agreed in regard to the propriety of dividing a district into subdistricts for assessment purposes. Some hold that a drainage district must be treated as a unit, and because it is a unit consideration should not be given to the different costs of parts of the work in apportioning the total cost according to the benefits. Other authorities insist that a landowner must not be assessed to help pay for work done in other parts of the district when it does not benefit him.

Few court decisions touch on this question; some can be found supporting either position. A drainage district in Illinois must be considered and assessed under the Levee Act as a unit according to the decision in Freesen *v.* Scott County, Drainage and Levee District, 283 Ill. 536, 119 N. E. 625, which reads, in part, as follows:

> The ninth refused instruction submitted six special interrogatories to the jury, in which they were asked whether they found that certain localities in the district needed more particular and minute drainage, and whether the proposed ditches (naming them) were a benefit to any portion of the district except that in which the particular ditch was located. The instruction was bad for the reason that the improvement and the effect thereof as to benefits on each tract of the land in the district must be considered as a whole, and not whether some part of the improvement or one of the different proposed ditches would or would not benefit some particular tract.

Under the Mississippi drainage law the court must decide whether the work to be done requires a combined system of drainage. When a combined system has been approved, the Supreme Court held in the case of Wheeler & Sibler *v.* Bogue Phalia Drainage District, 64

Sou. 375, that the cost to be assessed is the total cost of the combined system, and the commissioners are not required to ascertain what ditches drain each particular tract and assess each tract with only the cost of such ditches.

The following extract from Monson *v.* Board of Supervisors of Boone and Story Counties, et al., 167 Iowa, 473, 149 N. W. 624, shows how the Supreme Court of Iowa views this question:

> That part of the main drain extending from the mouth to the "junction" point was excavated to a considerable depth. It was 6 feet deeper than would have been necessary for the use of the greater part of the district. But there were certain lands quite remote from the main drain, the elevation of which was so low that they could not be successfully drained without giving this extraordinary depth to the main. Necessarily the greatest depth of the main is through the highest ground which has least need of it.
>
> The main drain in this case was 15 feet deep in some places. The trial court awarded some relief to the owners of lands in sections 16, 17, 18, 19, 20, and 21, all of which were located near the main drain where there were no branches. The benefit of the main drain to these lands was that of outlet only. The elevation of these lands was such that they had no need of the extraordinary depth of the main drain. This fact was taken into consideration by the trial court in awarding relief. It is urged that this was not warranted by the statute. We think that this also was not necessarily inconsistent with the provisions of the statute. It does not follow, however, that, because the extraordinary depth was required for the drainage of particular lands of low elevation within the district, the extra cost of such extraordinary depth should all be borne by such lands.
>
> Various considerations enter here. The owners of the lands of lower elevation were entitled to a scheme or plan which would give them some drainage before they could be charged at all with contribution toward the completed enterprise. But the fact remains that if their problem of drainage was clearly greater, and its solution through a public drain clearly involved extraordinary expense, not beneficial to the rest of the district, such fact could properly receive consideration by the appraising board in arriving at an equitable apportionment.
>
> For instance, suppose the main drain had been constructed to a shallower depth, and that such depth was insufficient to furnish complete drainage to those areas of lowest elevation, but was sufficient for all other areas of the district. It is manifest that the lessened benefit accruing by such construction to such lands of low elevation would be a proper consideration in assessing benefits against the owners, and that it would tend to reduce such assessment, notwithstanding the classification of such lands as "low," "wet," or "swampy." It would seem to follow logically that, if the deepening of such main drain to an extraordinary depth would confer no benefit on certain lands of high elevation, such fact would likewise be a proper, though not a controlling, consideration in assessing benefits against such land of higher elevation notwithstanding the classification of such land as "low," "wet," or "swampy."

The basic rules which should be followed in all cases are that the assessments must be proportional to the resulting benefits and the ratio of assessments to benefits must be the same throughout the district. The assessments are not to be based upon the cost of any part of the work but upon the benefits resulting from such work. Now, if the conditions on one branch or lateral drain are such that the cost per acre to the lands benefited is larger than on other branches, or, if part of the lands are so low that an extraordinarily deep ditch is required to drain them, or, if part of the lands in the district are cut off from the outlet by a rock ledge, thus requiring very expensive work for their sole benefit, the fact that it costs more to drain such lands than it does to drain others in the district is proof that such lands have smaller natural advantages with regard to drainage than other more fortunately situated lands. This being true, their un-

drained value would be less than the value of the other lands in the district. When such disadvantages are removed by the construction of the drainage improvement all lands in the district would be equally valuable if all other things were equal, and consequently the benefits received by the lands which were at a disadvantage will be greater than those of the more fortunately situated lands. So, wherever the statutes and the courts do not forbid such action, a district whose several parts are distinguished by topographical features clearly affecting the cost of the work may well be divided into subdistricts for assessment purposes.

ASSESSMENTS IN TWO DISTRICTS.

Land is subject to assessment by two or more drainage districts if special benefits accrue to it from improvements made by each of such districts. First, when a drainage district organized adjacent to an older district has its improvements so designed as to improve the drainage provided by the older district; second, when a district is organized within an existing district for the purpose of securing more complete drainage; and, third, when a new district is organized covering all of the territory in an old district, possibly annexing other lands, and enlarging or improving the drainage system.

In the first case there are two rules in regard to the parties against whom the assessment for the new benefits is levied. In some States the assessment is levied against the older district as a whole, while in others the assessments are levied directly against the lands benefited.

The Wisconsin drainage law provides that the boundaries of a drainage district shall not encroach on those of another district above or below it, and if through the construction of a ditch, drain, or levee increased cost shall entail upon the lower district in providing means to carry off water or remove sediment flowing from the higher district the higher district shall be liable for such increased cost. In Rattlesnake Drainage District *v.* Koshkonong Mud Creek Drainage District, 136 N. W. 631, the Wisconsin Supreme Court held that the fact that only part of the lands in a drainage district is benefited by an improvement made by another district does not affect the validity of an assessment of benefits against the first district, it being presumed that the assessment will be fairly apportioned upon the lands receiving the benefit by the authorities of the first district. As the Rattlesnake district had not provided complete drainage because of the insufficiency of the outlet, the lower district was entitled to a percentage of the benefit assessments made by the Rattlesnake district depending on the amount of drainage which was furnished by the improved outlet; the Koshkonong commissioners measured the depth of water in the ditches at each tract of land in the Rattlesnake district and compared it with what it would be after the outlet had been improved by their district, and the total benefits so found were assessed in a lump sum against the Rattlesnake district.

On the other hand, the statutes and decisions of Arkansas, Missouri, Iowa, and Nebraska provide that assessments shall be levied against all benefited lands whether or not some such lands be in other drainage districts. There are court decisions in each of these

States, and their reasoning is similar to that of the Nebraska Supreme Court in State ex rel. Sheffer *v.* Fuller, 120 N. W. 495; 83 Nebr. 784, where the court said in part:

> Relator alleges that his land is within the limits of another proposed drainage district, and that the law does not authorize or contemplate the overlapping of those districts so that real estate may be subject to separate assessments in as many distinct districts. The statute does not refer in specific terms to the overlapping of districts, nor does it forbid their formation. While some complications may arise in the prosecution of public improvements on land within two or more districts and in assessments to pay therefor, yet we are of the opinion that the objection made is not a serious one. Relator's land can only be assessed for, and to the extent of, benefits actually bestowed by virtue of the improvements made by any particular district. The assessment can only be laid after notice, and, if the levy is not supported by the facts, the landowner has an ample remedy by appeal to the courts wherein upon inquiry the truth may be ascertained and a judgment rendered that will amply protect him in his property rights. If his land may be improved by the construction of ditches or dikes in two or more districts, he ought to pay to the limit of those benefits. To hold otherwise would permit the owner of a large tract of land included in a district which had not benefited that land to any appreciable extent to receive the advantage of an improvement made by another district and yet escape payment therefor.

In Illinois both the lands directly benefited and the benefited district as a whole may be assessed, or one may be assessed and the other omitted.

There are many examples of assessments where a drainage district is organized within an older district for the purpose of obtaining more complete drainage. The methods of organizing and of apportioning assessments are, in general, identical with those required in the original district, but the original assessments constitute a prior claim. The following extract from the Syllabus of Drainage Commissioners of Washington County Drainage District No. 4, *v.* Eastern Carolina Home and Farm Association, 81 S. E. 947, shows how the courts regard such districts:

> Where a drainage district was organized under the laws of 1909, chapter 442, the formation of a drainage district under the same law and Laws of 1911, chapter 67, lying wholly within the boundaries of the existing district, for the purpose of benefits to accrue solely to land within the smaller district from its construction of laterals, the organization of such district was ancillary to the larger district, and valid, and its bonds issued subject to assessment for the principal and interest of the bonds of the larger district were valid.

The converse is also true. It has been held that lands included in one drainage district may be included in a larger district and assessed if additional benefits accrue. A drainage district may also be included in a levee district and assessements may be imposed by the proper authorities in each district for benefits received.

In Illinois, under both the farm drainage act and the levee act, subdistricts may be organized for more minute drainage for particular lands and the lands so benefited may be assessed for the costs. Such subdistricts are under the authority and control of the commissioners of the original main district.

The third class of assessments in two districts is found where it is desired to widen, deepen, enlarge, or change the improvement in a drainage district, or where the original improvement has failed to give the desired relief. A new district must be organized because

any change in the improvement will usually disturb the balance between benefits and assessments on various tracts in the district. An example is found in State ex rel. Marshall *v.* Bugg, 123 S. W. 827, where the court held, as given in the syllabus:

> Under the statute, the county court, for the purpose of altering, deepening, or widening ditches previously constructed, and which comprised a drainage district, could organize another drainage district out of the same territory embraced in the former one, if sufficient reason existed; the question of the public utility of such second drain, as well as the question whether the landowners would be benefited by it, or should be assessed for its construction, being questions of fact for determination by the court.

Another case in point is Sharp et al *v.* Easton et al.; 94 N. E. 753, where the Indiana Supreme Court said, in part:

> The contention of the appellants that, because of the fact that they had been before assessed for drainage work in the attempt to give the basin inclosed within the watersheds named adequate drainage as an entirety, and that this prior work had given them complete drainage facilities, they can not again be compelled to contribute to the common enterprise is inequitable and not sustained by authority. The drainage of wet and overflowed lands is a matter of public concern, as well as a matter of benefit to individuals, and the power to drain any particular district is not exhausted by one effort. It has been repeatedly held that a drain may be established over the line of an existing one, and therefore assessments made a second time, if benefits accrue.

ASSESSMENTS AGAINST INCORPORATED TOWNS.

The drainage laws of many States provide that incorporated towns shall be assessed for the benefits they receive from drainage works. In other States incorporated towns can not be assessed for drainage benefits on the theory that the corporation has jurisdiction over drainage in its territory and, therefore, no other authority can assume such responsibility.

In States where a municipal corporation can be assessed for drainage benefits it is not unusual to find the corporation assessed a lump sum for the benefit it receives as a municipality and at the same time certain lots within the corporate limits may be so peculiarly benefited that assesments may be levied against them as in the case of farm lands. It is not necessary that both benefits be present to validate the use of either.

The benefits which usually accrue to an incorporated town are better drainage for streets and alleys and better health conditions. Sometimes there are special benefits due to an improved outlet for surface drainage or sewage or protection from overflow. Any benefit which adds to the attractiveness of a city as a place to live is sufficient. These benefits are difficult to evaluate because a city has no market value either before or after the construction of the improvement, and, therefore, their amount must be a matter for the judgment of the assessors. Some benefits, like better street drainage can be evaluated, but most of them are somewhat intangible and their value will vary with conditions.

In most States when special benefits are conferred upon certain lots in an incorporated town such benefits can be evaluated and assessed. The different elements of benefit affect the value of city lots and farm property in a different degree; health and accessibility factors have more weight and improved agricultural conditions less.

The increase in value due solely to the drainage improvement is the measure of the benefit as in farm assessments.

We find such assessments as low as 50 cents per lot, although they necessarily vary greatly. It would seem poor practice to include property within the assessment district which will not be benefited in a larger amount than 50 cents, for the cost of collecting and accounting might be more than the assessment, and furthermore, the inclusion of any large number of such parties adds greatly to the cost of organization proceedings. It is impossible to draw a boundary line around a district in such a way that all of the lands benefited will lie inside and all those not benefited will be excluded, for special benefits radiate outward, gradually becoming rarified to general benefits to the community at large. Hence district boundaries should be so drawn as to exclude special benefits that would not repay the cost of collection.

No rule can be laid down as to assessments against municipalities, because the proper method depends on the statutes and practice in the several States, while the amount of the assessment depends on the circumstances in each case.

An interesting case is found in Trigg, Sheriff, et al., *v.* Henderson Cotton Mills (Ky. 1917), 197 S. W. 1074. The plaintiff's land assessed by the drainage district lay outside a city which was also assessed and the limits of the city were later extended so that they included the plaintiff's property; the drainage commissioners levied a maintenance tax upon the property and upon the city in proportion to their original assessments, and the plaintiff brought suit against the district, claiming that he was doubly assessed, since he was required to pay his proportionate part of the city's assessment as well as the assessment which had been laid against his property individually. The court held that there was no double taxation, since--

> * * * one tax was imposed by the board of drainage commissioners because of special benefits to the property. The other tax was imposed by the city itself, not because of any special benefits to the property taxed, but to discharge its statutory obligation to contribute toward the maintenance of the ditch, because of general benefits resulting to the city as a whole and enjoyed alike by all its citizens. When the limits of the city were extended so as to include the property of plaintiffs, the special benefits resulting to their property from the construction and maintenance of the ditch were not extinguished or diminished, but continued unimpaired. The only effect of the annexation was to make the property subject to taxation by the city for its proportion of all municipal indebtedness then existing or subsequently contracted (authorities cited. * * *). Thereupon the property in question stood in precisely the same attitude toward the tax levied by the city for the purpose of discharging its liability to contribute to the maintenance of the ditch, as other property in the city not specially benefited by the improvement. It will thus be seen that the liability of the property to pay the two taxes grows out of separate and distinct obligations: the one to pay the special benefits, the other to pay its part of the general benefits resulting to the city as a whole. Hence the payment of the tax levied by the city is no part of the price payable for the special benefits resulting from the construction and maintenance of the improvement, and the imposition of the two taxes can not be regarded as double taxation.

It is the opinion of the writer, although without support in the reported decision, that while there are two kinds of benefits present in this case it is misleading to call them "special" and "general." The land was assessed for a special benefit, as was the city, since assessments can not be levied on general benefits. The tax levied

upon the plaintiffs' property by the city was for the purpose of paying off an assessment for a benefit, which, as far as the plaintiffs were concerned, was a general one, but, as between the drainage district and the city, was a special benefit to the city as a whole.

RAILROAD ASSESSMENTS.

All States have clauses in their drainage laws authorizing the assessment of railroads for drainage benefits and providing methods of determining, levying, and collecting such assessments.

The majority of State drainage laws require that the assessments shall be in proportion to the benefits derived, and a number specify that only physical benefits to track and roadbed shall be considered, while others declare that the benefits received by a railroad are of a different nature from those accruing to agricultural lands. Most agree that when, in the judgment of the authority which has the power to establish the drainage district, a railroad will receive some benefit from the proposed improvement, it should be included in the drainage district.

The Supreme Court of Minnesota has held that the right of way of a railroad company paying a gross-earnings tax in lieu of all taxes and assessments is exempt from assessment for drainage benefits. The courts have held that it is not competent for a railroad to claim exemption after it has been properly included in a drainage district. In Chicago, Milwaukee & St. Paul Ry. Co. *v.* Monona Co., 122 N. W. 820, the Iowa Supreme Court says, in part:

> The inclusion of the property within the boundaries of the district is, as we have hereinbefore held, an exercise of legislative power which the courts can not review or set aside (authorities cited). But the courts may, and when their jurisdiction is properly invoked will, review the assessment or apportionment of the cost of the improvement, and, if inequitable or unjust, apply the appropriate remedy.

In determining the amount of benefit received the first question is: Shall the railroad lands be assessed on the basis of agricultural lands, or shall the benefits to the railroad property be considered? Assuming that the land occupied by the road will be made agriculturally more productive by the proposed drainage, also that the railroad company will be able to carry on its business more cheaply or better, which benefit shall be used as the basis for the assessment?

The common procedure is to consider railroads and highways subject to assessment on a different basis from agricultural lands, because the railroad property is used for business quite different from agriculture and the resulting benefits are different in kind and amount.

It is not uncommon to find districts where railroad rights of way are assessed on the same basis as agricultural lands, sometimes at the same rate per acre; but, in other instances, the rate per acre is made from two to twenty times the assessed rate for adjacent farm lands.

This method is rapidly becoming obsolete, and is not to be recommended. It has been prohibited by most laws which usually stipulate that railroad and highway assessments shall be made separately. The courts of most States generally have held such assessments illegal, but in a few States have held the contrary.

The Supreme Court of Illinois in Commissioners of Highways *v.* Drainage Commissioners, 127 Ill. 581, says that where the law provides that the lands of a district shall be classified, a classification of highways is not necessary, as they form a class by themselves. The Iowa Supreme Court, in Chicago, Rock Island & Pacific Ry. *v.* Wright County Drainage District No. 43 et al., 154 N. W. 889, said:

* * * True, if figured out on a mere acreage basis, the amount assessed is materially greater than the average assessment laid upon the farm lands in the district, but that in itself is quite manifestly an insufficient ground for setting aside or reducing the assessment, for the statute does not contemplate the treatment of the right of way solely as a mere fraction of the agricultural area in which it is found. Upon it is placed the plaintiff's road over which commerce is carried on. Upon it are the graded roadbed, the ties, rails, bridges, culverts, fences, and whatever more is found convenient in caring for and promoting the business to which it is devoted. That it was competent for the board of supervisors, notwithstanding the denial by the plaintiff's witnesses, to take all these matters into consideration and to find that the solidity and safety of the roadbed, the effective life of the ties, the maintenance of the tracks, culverts, bridges, and fences would be materially promoted by the drainage of the swamp and surface waters from its right of way and from the immediately adjacent premises, can not be doubted. Then, too, the right to assess is not dependent upon a showing of benefits in the shape of an immediate increase in market values, but actual values, intrinsic value or worth. Camp *v.* Davenport, 151 Iowa 38; 130 N. W. 137, and cases there cited.

It has been held in the case of the Illinois Central Railroad Co., *v.* East Lake Fork Drainage District, 21 N. E. 925, that a provision in the drainage law authorizing the assessment of a right of way and tracks of a railroad company for benefits thereto from the proposed drainage is not unconstitutional and void because such right of way and tracks can not be benefited for agricultural and sanitary purposes, since the benefits to lands are not confined to agricultural and sanitary purposes, but the law authorizes the levy of such assessments in proportion to any benefits received from drainage. In the case of Cache River Drainage District *v.* Chicago & Eastern Illinois Railroad Co., 225 Ill. 398: 99 N. E. 635, the syllabus states:

That in assessing lands for a drainage district improvement, no acre of farm land was assessed more than $3.08 an acre and no acre of adjoining land used as a railroad right of way, but constituting the same kind of land was assessed less than $41.66 an acre, does not show gross discrimination.

There is great difference of opinion as to the elements of benefit which railroads receive from a drainage improvement. Such benefits may be roughly divided into two classes: First, the physical benefit to the railroad property; and second, the prospective benefits resulting from the increased business which will come to the railroad by reason of increased productivity of the land benefited by the drainage.

The laws of Alabama, Delaware, Florida, Georgia, Kentucky, Mississippi (1912), Missouri, Nebraska, North Carolina, Oregon, South Carolina, Virginia, and West Virginia specify that only physical benefits shall be considered. In some of these States the statutes after making provision for the levying of assessments for benefits which will accrue to the right of way, roadbed, and other property, add "but no benefits may be assessed for any increase in its business that may come to the road because of the construction of the improvement." The courts of several other States have also taken this view, as, for example, the Iowa Supreme Court in Chi-

cago & North Western Railroad Co. *v.* Board of Supervisors of Hamilton County, 165 N. W. 390, quoting from the syllabus:

> While all the benefits resulting to a railroad company's property within a drainage district from the drainage improvements must necessarily be considered in making the assessment, other benefits resulting to the company or its property because of the improved conditions of land adjacent to the district or because of any other resulting advantages which it enjoys in common with the general public are too remote and intangible to be made a basis of levying assessments.

In referring to assessments based upon "sanitary, esthetic, and commercial benefits," the Illinois Supreme Court in Cache River Drainage District *v.* Chicago & Eastern Illinois Railroad Co., 225 Ill. 396, 99 N. E. 635, said in part:

> The indirect, uncertain, and speculative benefit which may be derived from the increase of agricultural production and passenger traffic is not an element to be considered in assessing benefits to be derived from drainage. It is the direct benefit to the railroad as property, and not to the company in its business, which is to be considered. Whatever tends to decrease the expense of maintenance of the track and railroad or the operation of trains is a legitimate subject for consideration, but not the possible increase of business arising from the general increase in productiveness and prosperity of the country and the community.

On the other hand, the Alcorn Act, which is one of Mississippi's drainage laws, states that increased revenues to accrue to the railroad shall be considered in fixing the benefits. In a recent case from Arkansas, the Circuit Court of Appeals in Thomas *v.* Kansas City Southern Ry. Co., 277 Fed. 708, said in part:

> The contention that appellant's land was not benefited is of more substance. The court found that there were no direct benefits by way of protecting the rights of way of appellants from overflow by flood waters, but found that there would be resulting traffic benefits through haul of the increased croppage on the lands within the district because of overflow protection. It also determined that such traffic benefit was sufficient to authorize assessment, citing St. Louis & San Francisco Railway Co. *v.* Bridge District, 113 Ark. 496, 168 S. W. 1066. The Supreme Court of the United States has recently expressly decided this traffic benefit as one to be taken into account, when it said in the case of Bush *v.* Bronson, 251 U. S. 182, 40. Sup. Ct. 113, 64 L. Ed. 215:
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> "To this must be added the obvious fact that anything which develops the territory which a railroad serves must necessarily be a benefit to it, and that no agency for such development equals that of good roads."
>
> The evidence is that at present only about 10 per cent of the acreage within the district is tilled or tillable because of water, but that the wild land is rich, and would be cultivated, if protected from overflow; that appellees were the only railroad serving this locality. There is the further consideration, upheld in the Bush case, 251 U. S. 182, at page 190, 40 Sup. Ct. 113, 64 L. Ed. 215, that the legislature, by inclusion of appellees' property within the district, has declared that it is benefited. Under the Bush opinion, in the Supreme Court, this would tend to establish the existence of traffic benefits, such as would justify assessment for district purposes.

In connection with the last paragraph of the above opinion, it should be stated that the drainage district in the above case was created by a special act of the legislature.

There is no doubt that any increase in the productivity of the lands served by a railroad will ultimately increase the revenues of the railroad company. We find many railroads giving active aid to all enterprises of the farmer, often maintaining a corps of experts to assist and advise along the lines of agricultural development. Still, increased revenues due to drainage improvement are speculative in that no one can foretell just how much they will be. Sup-

pose a drainage district is organized in a heretofore undeveloped area crossed by only one railroad; to determine the amount of benefit which will accrue to the railroad from increased business the following questions must be definitely answered:

1. How much freight due to the drainage improvement will develop?
   (*a*) What percentage of the area will be devoted to raising hay, grain, cotton, etc., which produce but little freight of a low class, and what percentage to potatoes and truck crops which produce a large amount of high class freight? How much of the acreage will be devoted to livestock raising or dairying?
   (*b*) How large will the crops be?
   (*c*) What part of the produce will reach this road as freight? How much produce will be consumed at home and in local markets? What highways will be built in the district, and will they serve to divert any of this produce to other railroads or local markets? Will other railroads be built that could serve the territory, and how much freight will be diverted to them?
2. How much passenger traffic due to the drainage improvement will develop?
3. What effect will the increase in traffic have on the earning power of the road?

Many other factors would affect the amount of the increased revenue, but these questions are sufficient to show what an indefinite and uncertain quantity the benefit due to increased traffic is.

To assume that the benefit of drainage improvement to a railroad is the difference in the value to the railroad company of the traffic originating and terminating in the district before and after the construction of the improvement is erroneous. A large part is due to increased industry and invested capital of the inhabitants and to the general prosperity of the community. As in the case of agricultural benefits, the only ones which may be considered are those due solely to the improvement.

In view of the positive prohibition of the consideration of future benefits due to increased traffic by many States and courts, and to the extremely speculative nature of such benefits, it seems wise to abandon consideration of such benefits as a basis for assessments and to limit consideration to the physical benefits derived from the improvement.

There is a great diversity of views between drainage engineers on the one hand and railroad engineers on the other as to what elements of benefit are present. Drainage engineers have enumerated a great many, while railroad engineers insist that there are few elements of benefit, some going so far as to say that there are none.

A drainage engineer has listed the following items of benefit:

Tangible benefits in "lessened cost of maintenance" and "increased efficiency," which can be calculated and capitalized; protection from flood which can be determined from the books of the railroad covering periods of former flood—saves the following costs:

(1) Labor of filling and placing sacks, hauling and placing rock for track protection.
(2) Cost of work train.
(3) Watchman.
(4) Slow orders.
   (*a*) Cost of slowing down trains, damage to equipment.
   (*b*) Extra fuel required.
(5) Loss of time.
   (*a*) Extra cost for pilots and train crews on passenger and freight trains.
   (*b*) Rerouting.
(6) Loss of freight cars, freight, equipment, etc., in high waters.

(7) Actual cost for repairs after the flood has subsided.
  (*a*) Ballasting track.
  (*b*) Relining track.
  (*c*) Resurfacing track (on account of wet fill and settling, track may require resurfacing and relining many times).
  (*d*) Repair of slides and washouts.

Under "increased efficiency" it is more difficult to establish costs from the books of the company, but we can get an estimate of the following:

(1) Cost of using foreign tracks.
  (*a*) Extra expense of train crews, passenger and freight, in detouring.
  (*b*) Fuel.
  (*c*) Damage to equipment on account of difference in grades and curvature on foreign tracks.
  (*d*) Payment to foreign road on account of use of track.
(2) Damage to equipment operating on wet track.
  (*a*) Slow orders, stopping and starting trains.
(3) Damage or loss of train equipment on account of low joints and uneven track.
(4) Longer life of ties, fences, posts, telegraph poles, piling, wooden culverts, and other timber.
(5) Maintenance of fewer and smaller culverts.
(6) Removal of aquatic rodents which burrow into and honeycomb roadbeds in the vicinity of standing water.
(7) Solidity of the roadbed and prevention of settling.
(8) Prevention of the absorption of water by the roadbed.
(9) Less damage or danger from heaving of track caused by freezing of a wet roadbed.
(10) Less liability of sinking when the roadbed thaws.
(11) Elimination of bridges, trestles, and culverts no longer needed.

The speculative benefits, which may be larger than the tangible, but harder to establish in court and to capitalize:

(1) Element of risk.
  (*a*) Danger of loss of life and property from operating trains in high water.
(2) Protection to freight stored in yards.
(3) Loss for delay in mail service.
(4) Loss on perishable freight.
(5) Protection by reason of prevention of erosion and cutting of fill and track.
(6) Risk in running trains over strange tracks, using strange signals, possibility of derailment or collision.
(7) Loss of freight and passenger business.
(8) Loss of business which would have to be refused because of flood conditions.
(9) Benefits derived from the increased prosperity of the community.
(10) Loss of reputation as a safe road by passage of trains over overflowed tracks.
(11) Possibility of construction of second, third, or fourth track and general betterment under better physical conditions.
(12) Loss of freight terminal yards.

A drainage engineer says that benefits to railroads may be divided into increased physical efficiency and decreased maintenance costs. Under increased physical efficiency the main item is the ability to drain borrow pits and lower the water table in the fills, thus doing away with soft track. Under decreased maintenance charges the chief item is due to the possible omission of timber structures, such as bridges and trestles.

A railroad engineer fails to find any benefits reducing maintenance or increasing efficiency of the track, aside from flood protection, and further says:

In the average drainage district where no flood protection is afforded we have arbitrarily adopted a value of $200 per mile as representing the benefit to the track. This came about through a realization that we could not be entirely exempted and represented an amount acceptable to the average fair-minded drainage commissioner. It is not based on any figures prepared from data.

When districts relieve us of flood conditions we usually have something definite to work from. For instance, if a certain location included in a district is subject to frequent overflow or washout we gather from our monthly flood damage reports the actual cost of flood repairs for that location and reduce the same to an average annual expenditure on this account. The annual expenditure then capitalized, usually at 6 per cent, is considered to be the resulting benefit if the proposed ditch will prevent future floods. Where numerous bridges are maintained through a valley and a drainage ditch makes it possible to eliminate some of them, the benefit then becomes the capitalized value of the annual cost of maintenance for the amount of bridging to be eliminated, less the cost of elimination.

A railroad official says that railroads do not get the benefit generally ascribed for the reason that drainage work is done to benefit agriculture, not railroad operation; that assessments should be those of adjacent agricultural lands, together with any saving on account of decreased maintenance charges from the elimination of trestles and shortening of bridge spans and sometimes from the prevention of water overtopping the roadbed.

The chief engineer of a large railroad system says that drainage improvements will benefit the railroads in the following cases:

(1) Where water is drained from the sides of fills, especially where the fills slough off regardless of the height of the fills; (2) where the removal of trestles can be safely accomplished; (3) where the drainage system will prevent the roadbed from being overtopped with flood water. His road will accept reasonable assessments made on the following basis: (1) Assessment of right of way on an acreage basis at the same rate as adjacent farm lands; (2) benefit from the removal of trestles (capitalize the saving in maintenance and deduct the cost of making the fill); (3) benefit of lowering the water table (lowering the water table a certain distance is the same as adding the same number of feet to the fill. Where the water table is within four feet of the rail the roadbed is always a source of trouble); (4) incidental benefits: (*a*) drying up adjacent lands removes muskrats, which burrow in the fills and cause settling; (*b*) general health benefits.

He points out that it is impossible for railroads to give assessors any help in arriving at the amounts of these savings and benefits except in the matter of benefit due to elimination of bridging, because the costs of the various items are not separated in their records of operating expenses.

The chief engineer of another system, which has had experience with several hundred drainage districts along its lines, says that the only benefit which the railroad can receive is such as will decrease the cost of maintaining the structures. The fact that there may be continuous moisture or standing water on the right of way does not imply that there will be any benefit to the railroad after the water is removed.

We do not find any appreciable benefit in lowering the water table below about 3 feet from the rail. Underground drains, therefore which do not carry surface water except as it percolates into the ground very rarely result in any benefit to the railroad structure. In general, of course, open ditches, channel rectification, and that class of improvements which facilitate the flow of surface water are likely to have more beneficial results, although in these cases there is benefit in only a portion of the improvements. Where the railroad track is well above any highwater mark and has provided sufficient bridge openings any rectification of channels is ordinarily of no benefit.

The courts have often been called upon to decide railroad assessments, but they have generally been more concerned in determining the equitableness of the amount so assessed than they have in defining the elements of benefit. Some decisions, however, specify some elements of railroad benefits as properly considered by the assessing board. A few will be quoted at some length because of the light they throw on this question.

An interesting decision is found in Chicago & North Western Railroad *v.* Board of Supervisors of Hamilton County, 153 N. W. 110; 171 Iowa 741. This was the appeal of a suit by the railroad company asking a reduction of its assessment of $1,500. The trial court had reduced this to $800. The railroad company contended that its right of way would not be benefited by the drainage and ought not to be assessed or, if chargeable, $1,500 was out of proportion to the benefits. Engineers in the employ of the railroad company testified that the drainage of ponds and surface water from the right of way was of no advantage to the railroad. The Supreme Court characterized this testimony as a statement so radical and contrary to the teachings of human observation and experience in general that the court was justified in refusing to be guided thereby. The court said in part:

> In the court below and in this court the board of supervisors adopted the theory that the benefits of the drainage to the railway are to be ascertained by reference to the greater ease and lessened expense of maintaining the way, the greater permanence and security of the fills and embankments, the increased life of ties, posts, and other wooden material, the opportunity afforded the railroad company to substitute pipe for trestles, and thereby give its track a safer foundation with decreased outlay for upkeep, and other things of that nature. There was evidence also tending in some degree to show the difference which the changed conditions would make in the expense of maintaining the road and right of way. That these conditions, so far as they are found to exist, do afford a foundation for a fair estimate of the benefits, is a reasonable conclusion. That there are still other conditions which in a proper case may be considered in estimating such benefits is, no doubt, true; for example, the benefit to the right of way as a mere matter of acreage without special reference to the present use being made of it. See Railroad Co. *v.* Centerville, 153 N. W. 106, decided at this term of court. If the property of a railroad company were being subjected to a complete and itemized valuation to ascertain a basis upon which to regulate its schedules of rates, it would naturally and properly insist that its right of way be estimated upon the present value of the lands so occupied, for it could not reproduce its road at the present time except on the basis of present land values, and, if so, then it would seem that the improvements which clearly tend to increase such value is a tangible benefit to the company and its property.

The same court in Chicago Great Western Railway Co. *v.* Board of Supervisors of Dubuque County, 176 Iowa 690; 158 N. W. 553, pointed out what are some of the elements properly to be considered in assessing railroad benefits, in a particular case, as follows:

> Some of the resulting benefits to the company were the removal of the stagnant water standing in the swamp; the improvement left the right of way and surrounding country free from water, thus making a drier and better roadbed; the water was carried off more quickly in case of floods, thus preventing washouts of the tracks; defendant was permitted to remove the ditch from off the right of way, thus giving the railroad the use of its entire 80 feet, as well as the expense of constructing and maintaining the nine private crossing bridges, referred to by the appellant. Furthermore, the present bridges take the place of these nine former bridges maintained by the railroad company. The present bridges are on the right of way of the drainage dis-

trict and over the drainage ditches, and are built and maintained by the drainage district.

An interesting case which shows the necessity of proper methods, is found in Oregon-Washington Railroad & Navigation Co. *v.* Board of Commissioners of Yakima County, et al., 175 Pac. 37. In this case a drainage district was organized to drain away surplus water from lands which had become alkaline because of such excess water. The total cost of the drainage work was $15,415, and of this amount $490 was assessed against the railroad company. There were 4 miles of right of way in the district, with an area of 53.1 acres, as compared with the total acreage of 8,000 for the entire district. The court said, in part:

Figured as acreage, the assessment of appellant's right of way is about five times greater than the assessment of adjoining property. It is admitted that the land of the railroad company is the same as other land in the community, and that the commissioners had a very definite idea that out of the whole cost of the improvement appellant should pay about the sum of $500. The assessment is justified by counsel, although it is questionable whether the commissioners had all that is now advanced in mind, for they frankly admit that before proceeding to the levy an arbitrary sum was agreed upon to be assessed against the appellant. But, if an assessment can be sustained in reason, we take it that it will not be rejected for this account. It is now said that the commissioners found that the drainage tended to lower the general water level in the drainage district and in the vicinity of appellant's road, thus contributing to the solidity and safety of the roadbed and the effective life of the ties, thus lessening the cost of maintenance; that it protected the road in a material degree from damage by floods and high water, which were likely to occur; that it dried up and made passable the county roads in the vicinity of appellant's line, thus making it more accessible to patrons of its road; and that it reclaimed much agricultural land in the vicinity of the road, which but for the drainage would have remained fallow, thus contributing to the benefit of the road by an increase of its business. But these reasons are not enough to sustain an assessment of the property of the appellant over that of other lands and other business within the limits of the district. While we recognize that some property may be benefited to a greater extent than other property, the benefit must be sustained upon reasonable grounds.

Some of the reasons urged for sustaining the greater assessment of appellant's property may be called special benefits, while others are as clearly general benefits. One of the things urged as a special benefit is that the drainage will contribute to the solidity and safety of the road, and add to the life of the ties, and lessen the cost of maintenance; but, if the commission has acted upon that assumption, it is hardly borne out by the record, for the road is upon a grade elevated above the surface of the surrounding country, has been in no way impaired by existing conditions, and the greater preponderance of the testimony is that there has been no extra expense of maintenance by reason of the need of drainage to the adjacent agricultural lands, which have been alkalied by reason of the raising of the water table in that vicinity. In the light of the testimony, this condition ceases to be a reason, and becomes only an unsustained theory. That the drainage would protect the road in a material degree from damage by floods and high water is called a special benefit, but this is a benefit common to all the property in the district. We may grant that an assessment should be sustained upon this benefit, but it does not follow that it should be laid with heavier hand upon appellant's property than upon other property.

The other reasons urged, that the drainage will dry up and make the country roads in the vicinity more accessible, so that the patrons of appellant's road may more conveniently patronize it, is a general, and not a special benefit; for, if the drainage will make the roads more accessible, so that more business will follow, it will make the roads more available to the patrons of the road, and make it possible for them to haul their products more cheaply and conveniently than they would be able to do if the work were left undone. * * *

We think, therefore, that the only special benefits are as noted, and that they are the same in kind as the special benefits occurring to the other property. * * * It can not be denied that there is a benefit to all of the property

that will sustain an assessment; but, if the district would put a greater burden upon one property over another, it must disclose some benefit different in character and special to the property which is made subject to the greater burden.

It seems clear that the basis for a high assessment upon any kind of property may be a benefit which is not necessarily "different in character and special to the property which is made subject to a greater burden," but a benefit depending on the use made of the property and differing only in degree from the benefits accruing to other classes of property.

ELEMENTS OF RAILROAD BENEFITS.

In determining the elements of railroad benefits it should be borne in mind that the best that can be hoped for is a crude approximation of the real benefits, and that it is useless to assert that benefits exist which can not be established in court. In fairness both to the drainage district and to the railroad, the following elements should be considered in the general case, while still others may be present in individual cases.

DECREASED MAINTENANCE.

Prevention of flood damage.—Where this item is present it is usually the largest in amount and the easiest to evaluate. All railroads keep an account of their losses and extraordinary expenses caused by floods, and if the improvement be designed to prevent all floods, thus saving all such losses, the benefit to accrue would be the average yearly loss capitalized at a fair rate of interest; however, as few drainage improvements are designed to prevent the largest possible flood but merely to reduce its height or shorten its duration, it is not usually just to consider all the railroad's flood losses saved. If during the time covered by the flood damage records, the railroad has made improvements which have served to reduce flood damage it should be given credit for the benefit arising from such improvement. As has been said, such benefit is not the cost of the work, but the capitalized annual saving.

Removal of surface water from the right of way.—This element of benefit is not susceptible of such ready evaluation as is the previous one. Railroad companies declare that their books do not show a decrease in maintenance charges when standing water is removed from the right of way. One reason for this is that maintenance costs are kept for the section as the smallest unit. A section is seldom less than 4 or 5 miles in length, a part of which may have standing water along the right of way and another part be thoroughly drained. There is no way to divide the costs of work done on the section as between wet and dry portions. Attempts to compare costs of maintenance of sections in low swampy country with costs in high and well drained country have been unsatisfactory, as manifestly other factors than the mere presence or absence of water are involved in such a comparison.

It seems reasonable to expect that water standing against an embankment for considerable periods, say within 4 feet of the base of rail, will tend to permeate the fill and render it soft, unstable, and more or less dangerous; and that this condition must be met by an increased maintenance expenditure on the track so affected. If this be admitted, it follows that the removal of the standing water will

confer a benefit upon the railroad. If the water does not stand within 4 feet of the base of rail, the benefit from drainage is appreciably decreased.

Decreasing the number or length of trestles and bridges.—Whenever such a benefit exists, it can be readily computed. The amount should be the capitalized annual savings in maintenance less the cost of making fills to replace the trestles or bridges.

Care must be taken that the improvement has a capacity at least equal to that for which the railroad company would ordinarily make provision. Drainage ditches can seldom take care of the largest possible flood, but neither can railroad bridges. Cases will be found where the railroad company is maintaining a greater trestle opening than is needed under undrained conditions, and then, of course, the computation of savings to the railroad should be based on the opening required by the unimproved conditions rather than on the actual length of trestle or bridge.

INCREASED EFFICIENCY.

In addition to the effects already considered, drainage improvements may benefit the railroads by giving greater security to traffic and better train service because of decreased danger of derailments due to soft track. These benefits are indefinite as to amount and of much less importance than those directly decreasing maintenance costs.

Of elements affecting both decreased maintenance costs and increased efficiency, the only ones which can be readily evaluated are flood protection and decreased length of trestles and bridges. There are few or no data in regard to the value of the other elements, and what there are would be valuable only in specific cases. Assessors whose duty it is to fix the amount of such benefits should make careful inspection of the railroad property affected and secure all evidence obtainable from the company's books, engineers, and section crews, as well as from others familiar with the conditions and should settle upon such an amount as the facts in the case render reasonable and just. In practice, the benefit assessment for all elements, except flood protection and decreased length of trestles and bridges, ranges from $100 to $1,000 per mile, not many exceeding $500. Since farm lands pay but a certain proportion of the full amount of the benefits they receive, the same proportion must be used in the case of railroad benefits.

The question of railroad assessments is well summed up by the Supreme Court of Iowa in Chicago & North Western Railway Co. *v.* Board of Supervisors of Hamilton County, et al. 162 N. W. 868. The court said in part:

> It may be admitted that in dealing with a railroad right of way or other similar property, it is practically impossible for any assessing officer to analyze his estimate of values or benefits and name a specific sum of money as representing the beneficial result of any one feature of the improvement, and this fact renders it a favorite topic for the purposes of cross-examination by counsel attacking such assessments. But the advantage so gained is apparent only. The assessment of benefits in such cases is but one of the frequent occasions in the administration of justice, where the jury or other body charged with the duty of estimating values is authorized to take into consideration all the facts and circumstances shown and make its own estimate, and the court will not overrule or interfere with it unless it be so plainly without foundation or

so extravagant as to demonstrate that it has been dictated by ignorance, passion, or prejudice.

EXAMPLES OF RAILROAD ASSESSMENTS.

The following examples of railroad assessments are given, not as illustrating the proper methods to be used or giving authoritative values for the elements considered, but only as showing some methods.

The method used in an Iowa case by a drainage engineer in 1910 was as follows:

There were 2,093 feet of wood trestles and about 400 feet of steel bridges on the three lines of track in the river bottoms where the flat lands were nearly a mile wide. It was agreed by the attorneys that the ditch 24 to 30 feet wide and 10 feet deep would in the course of five years erode the rich alluvial soil so that it would be as large as the river, 100 feet wide and 12 to 14 feet deep, thus requiring the construction of three new steel bridges 100 to 200 feet long. When the ditch reached this condition, being upon line with and joining the old stream, the two channels would care for 2¾ times the quantity of water that the old river with its more tortuous channel had carried. This trestle work would cost about $8 per lineal foot, and last eight years. Hence it had a maintenance charge of $1 per foot per annum. The cost of a modern heavy-traffic trestle of this height would be $14 or $15 per lineal foot. The annual saving then to the railroad for maintenance charges was 1,650 times $1 or $1,650, or for eight years, $13,200. As an offset to this benefit there was an earth fill to make, estimated to cost $4,870.

As under the laws of Iowa railroad companies are required to remove structures, construct the ditch across the right of way, and restore their own bridges, no attention was paid to the cost of erecting the three new steel bridges. The cost of the work to be done, $4,870, deducted from $13,200 leaves a net saving to the railroad company of $8,330. The betterment of the track running through the river bottoms by reason of the better drainage of the roadbed was reckoned at $1 per 100 feet of track, in round numbers making $265 per annum for this type of benefit. This added to $8,330 divided by 8, or $1,041.25 makes a total annual saving of $1,306.25. This amount capitalized at 4½ per cent amounts to $29,028, the actual benefits to the railroad company. The assessments are never as great as the benefits, and the railroad companies paid about three-fifths of this amount.

In a recent (1919) case in Kansas, the engineer for the district based his assessment on the reduced maintenance charges.

The annual maintenance cost per mile of the track within the district was taken at $800; of this 60 per cent was considered attributable to flood conditions affecting track in poor condition, which will be fully benefited, for main line track; and 20 per cent for branch line track. Low excess cost for main line track fully benefited was taken as 30 per cent, and for branch line track 10 per cent. The estimated decreased maintenance on this basis was capitalized at 5 per cent, making a benefit assessment of $71,552. The railroad company contended that the assessment was out of proportion to the benefits in view of the track raising, rock ballasting, and general improvement of lines made. According to the Kansas statute assessments against railroad property must be made on the basis of increased operating efficiency and reduced maintenance cost; track maintenance made necessary by flood shall be capitalized and form the basis for the assessment. Records of charges to operating accounts covering the years 1912 to 1917, inclusive, show the following expenditures for maintenance:

Within the district:

Main line—$825.41 per mile; $600.83 per mile exclusive of bridges, trestles, and culverts.

Branch line—$498.58 per mile; $409.60 per mile exclusive of bridges, trestles, and culverts.

Adjoining the district (track through hill country):

Main line (section 5 miles long)—$613.87 per mile exclusive of bridges, trestles, and culverts.

Branch line (section 11.5 miles long)—$215.80 per mile exclusive of bridges, trestles, and culverts.

Entire line:
Main line (316.75 miles)—$729.50 per mile exclusive of bridges, trestles, and culverts.
Branch line (131 miles)—$464 per mile exclusive of bridges, trestles, and culverts.

The foregoing figures show that track maintenance within the district is not higher than the average for the track included on the main line; the branch line even showing a lower figure for the track within the district.

Flood damage records kept for track within the district show the following:

Year.	Main line (5.67 miles).	Branch line (7.2 miles).	Total.
1907	$0.00	$100.00	$100.00
1908	204.00	0.00	204.00
1909	930.00	50.00	980.00
1910	0.00	0.00	0.00
1911	0.00	0.00	0.00
1912	0.00	0.00	0.00
1913	0.00	0.00	0.00
1914	0.00	0.00	0.00
1915	1,195.00	1,613.00	2,808.00
1916	78.00	3,300.00	3,378.00
1917	0.00	0.00	0.00
1918	0.00	0.00	0.00
Total for 12 years	2,407.00	5,063.00	7,470.00
Average per year	$200.58	$421.92	$622.50
Capitalized at 5 per cent	4,011.60	8,438.40	12,450.00
Capitalized at 6 per cent	3,343.00	7,032.00	10,375.00

In the preceding figures it is seen that the largest expenditures by far occurred in 1915 and 1916, totaling $6,186. The track raising and general improvement following this flood damage had for its object the avoidance of future expenditures due to floods of similar character, and it should be given due consideration in assessing benefits against the railroad. Adequate waterway exists beneath the railroad bridges across the three streams, and since railroad lines in the district are not of recent construction the roadbed is not affected by water standing against the embankment for the short duration of flood periods.

The following table shows the lengths of track submerged and above high water during the two flood years, 1909 and 1915, for track elevation existing during these years compared with what it would be with the present elevation of track.

	Track elevation 1909–1915.		Track elevation 1919.	
	Above high water.	Submerged.	Above high water.	Submerged.
Flood of 1909:	*Miles.*	*Miles.*	*Miles.*	*Miles.*
Main line	0.71	4.84	1.17	4.38
Branch line	1.77	5.57	2.21	5.13
Total	2.48	10.41	3.38	9.51
Flood of 1915:				
Main line	2.34	3.21	4.27	1.28
Branch line	3.86	3.48	6.21	1.13
Total	6.20	6.69	10.48	2.41

Considering the 1915 flood, with the present elevation of track 2.41 miles of track would have been submerged as against 6.69, a reduction of 4.28 miles, or 64 per cent. This percentage applied to flood damages for the years 1907 and 1918 reduces the total from $7,470 to $2,689.20, and the average yearly damage to $224.10; capitalizing this amount at 5 per cent would give $4,482 as the proper assessment on the basis of complete protection for the railroad, as compared with one made by the district engineer of $72,552.

RAILROAD DAMAGES.

A railroad company, should its property be injured, is entitled to damages in the amount of the injury the same as any other landowner. The several State drainage laws specify who shall determine damages, and the same body generally fixes the amount of damages suffered by all kinds of property. The usual damages claimed by a railroad company are those incurred in rebuilding old bridges or in building new ones, the costs of opening bridges and tracks to allow the construction of the improvement, and the cost of enlarging the channel of a stream or building drains across the right of way, if that work is done by the railroad company. There may be other items of damage, especially in districts where the improvements include channel rectification or levee construction.

Concerning the first item, that of damages due to building or rebuilding bridges over drainage district ditches, there is a marked difference in the various State laws. Some States (California, Colorado, Mississippi (Alcorn Act), Nebraska, Montana, Utah, Virginia, Wisconsin, and Wyoming) specify that the expense of adapting railroad bridges to the improvement shall be borne by the drainage district; but other States specify that such necessary expenses shall be borne by the railroad company and shall not be considered as an item of damage. The drainage law of Alabama says that where the bridge opening is over a natural watercourse the expense shall be borne by the railroad company, but where the opening required is not over a natural watercourse the drainage district shall pay the costs. The Michigan drainage law requires that the railroads make and maintain necessary openings in the roadbed required by drainage improvements, and build and maintain suitable culverts upon the serving of a prescribed notice. In passing upon this requirement the Michigan Supreme Court in Chicago & Grand Trunk Railroad *v.* Chappel, 124 Mich. 72, held that this section of the law manifested an intent of the legislature to require the railroad company to make such improvements without compensation, and that therefore this section of the law was unconstitutional. This decision was confirmed in Pere Marquette Railway Co. *v.* Weilman, 157 Mich. 702.

The weight of judicial authority seems to require that the railroads build and maintain suitable openings over natural watercourses to keep pace with the drainage development of the country in the same way that they are required to build street and road crossings when the commercial development of the community makes such crossings necessary. There are many court decisions supporting this proposition of which the following are often cited: Chicago, Burlington & Quincy Railroad Co. *v.* The People, 212, Ill. 103, and 200 U. S. 585; Lake Erie & Western Railroad Co. *v.* Smith, 61 Fed. Rep. 885; Cooke *v.* Railroad, 133 Mass. 185; New Orleans Gas Light Co. *v.* Drainage

Commission, 197 U. S. 453; Chicago, Burlington & Quincy Railroad Co. *v.* Board of Supervisors Appanoose County, Iowa, 104 C. C. A. 573; 182 Fed. Rep. 291.

When a drain is so located that it does not follow the natural channel where it is crossed by a railroad some decisions hold that the cost of the new bridge should be borne by the drainage district. See Indian Creek Drainage District No. 2. *v.* Chicago, Baltimore and Ohio Railroad Co., 295 Ill. 339; 129 N. E. 105. But the Supreme Court of the United States in Lake Shore & Michigan Southern Railroad Co. *v.* Clough, 242 U. S. 375, held that where the Little Calumet River was diverted from its natural channel and carried through a ridge into Lake Michigan, the railroads which were located on the ridge must pay the cost of the new bridges. Under this decision the responsibility of railroads for the costs of bridges over ditches not in the natural watercourse seems to depend upon the terms of the charters under which the railroads are operating.

In case water is diverted from other watersheds into a natural watercourse, thus placing an additional burden on the railroad company for bridging, there is ground for belief that the railroad company can not be compelled to enlarge or lengthen its bridges to accommodate such increased flow without compensation. See People *v.* Chicago & Eastern Illinois Railroad Co. 262 Ill. 492, 104 N. E. 831. It is probable that the rights of the railroads in such cases depend on the provisions of their charters as in the preceding discussion.

Concerning the second item of damages—damage due to opening bridges and tracks to allow the passage of dredge boats or to otherwise facilitate the work of constructing the drainage improvement—authorities generally agree that such costs should be paid by the drainage district, and the laws of most of the States so provide. The amount of such damage is usually the actual cost of opening the tracks or other work, determined after the event. Such damages are usually paid in cash.

The third item, the construction of the drainage channel across the right of way which some States require shall be done by the railroad company, is not open to much question. Where the statute requires the railroad company to do this work it generally specifies that the amount to be paid is the actual cost to the district of doing the same amount of work.

In some jurisdictions the courts have held that the railroad is entitled to damages for the use of its right of way for district use where such drains or ditches do not follow a natural watercourse. There seems to be little question as to the power of the drainage district to condemn such portions of the right of way when the drains or ditches will not interfere with the use of the right of way for railroad purposes, either present or future. In Steele *v.* Empsen, 41 N. E. 822, the Supreme Court of Indiana said, in part:

> It is claimed by appellant that the ditch is partly located on the right of way of the Ohio & Mississippi Railway Co., and that such location is not authorized, for the reason that property once taken and appropriated to one public use can not again be appropriated to another public use, citing City of Valparaiso *v.* Chicago & Grand Trunk Railway Co., 123 Ind. 467, 24 N. E. 249. The rule urged by appellant only applies when the second public use would naturally injure or destroy the uses for which such right of way was employed, and when the same could not exist without impairing the first uses.

In an Ohio case, Lake Erie & Western Railroad *v.* Hancock Co., 63 Ohio St. 23; 57 N. E. 1009, the court held that the location and construction of a public ditch across or upon the right of way of a railroad company, though the ditch be constructed of tiling and beneath the surface, was an appropriation of the company's property which entitled it to compensation for the value of the interest so taken.

In conclusion, it may be said that it is impossible to give a standard rule with regard to damages to railroads. Each district must be guided by the law under which it is organized and by the court decisions construing that law. The amounts to be allowed for the various items of damages can usually be readily estimated.

HIGHWAY ASSESSMENTS.

The assessment of benefits to highways is analagous to the assessment of benefits to railroads and, in fact, the same methods of assessment are prescribed by all State drainage laws. The laws of most States provide that highways shall be assessed according to the benefits due to decreased maintenance charges and increased efficiency. Arkansas specifies that highways shall be assessed in the same manner as farm lands, which is also the requirement for railroad assessments.

In practice, assessments of benefits to highways are determined in about the same manner as are railroad benefits. In some cases, the lands included in the highway are assessed at the rate per acre of adjoining farm lands, intensified two to five times. The general rule, however, is to determine the difference in the maintenance cost of the road before and after drainage, which amount, capitalized, is assumed to be the amount of benefit the highway receives.

Bearing in mind the discussion under railroad assessments, the benefits to be considered would seem to be those resulting from physical betterment due, as in the case of railroad assessments, to decreased maintenance charges and increased efficiency.

In the case of highways, decreased maintenance charges are made up almost entirely of savings in the repairs to the road itself, as it is seldom possible to decrease the size or length of highway bridges. The amount of such savings is very hard to determine, for, while it may be found by comparing the amounts spent on the undrained road with the maintenance charges on similar stretches of highway on well-drained ground, very little reliable data of such costs are available. Certain difficulties are always present when such a comparison is attempted, as, for instance, the different density and character of traffic, different soil conditions, different standards of maintenance and efficiency between the stretches compared, and the great dearth of cost data on maintenance work for all types of roads. However, whatever cost data have been compiled are public property, and for that reason are somewhat more available than are similar data pertaining to railroads. Where such savings can be determined, the benefit due to this cause will be the capitalized amount of the annual savings.

Increased efficiency means making the road better to travel over. There is some question as to whether this is a special or a general benefit and whether, when assessments have been levied against

individual tracts because of increased accessibility, an assessment should be placed against the road for the same benefit. The circumstances in each case will determine whether such a benefit should be considered. Such benefits are always somewhat speculative and are rarely of large amount. The amount depends on the saving of tractive effort and of time in hauling along the effected stretch of highway. The ton-mile is theoretically the unit of computation, and the amount of benefit depends on the amount and kind of traffic. A rough traffic census will give the cost of hauling over the undrained road, which should be compared with the cost on a similar stretch of the same type of road drained either artificially or naturally. The difference in cost of hauling, multiplied by the expected volume of traffic per year, will give the annual saving, and this amount capitalized will give the benefit due to increased efficiency.

Care should be taken to value correctly the traffic on a road which is avoided and left untraveled because of its undrained condition. It is proper to figure the traffic of the drained road at a reasonable estimate of what it will be when the drainage work is completed rather than what it is at present. The time allowed for prospective traffic to develop must however be limited so that no other factors than drainage will be responsible for the increased traffic. In some cases there is also another element of benefit that should be considered under this head, which arises when drainage makes possible the construction of a hard-surface road while it is not practicable under the undrained conditions. In a district where the road has not yet been built the benefit would be the difference in the cost of building before and after the construction of the drainage improvement.

In some cases where tile drains are constructed by the drainage district, surface inlets are built at the points where the drain crosses the highways, and the cost of these catch basins is added to the highway assessment. This practice is probably fair in Iowa, where benefits are not assessed but the cost divided among the landowners; but in States where assessments are based upon benefits this practice is unjust. If the highway has been assessed for the benefits of complete drainage and surface inlets or catch basins are necessary to give complete drainage to the road such an additional charge should not be made.

Whatever the amount decided upon by the board of assessors as the benefits due to both the decreased maintenance and increased efficiency of the highway, the ratio between the amount of the benefit and the amount of the assessment must be the same as in the case of farm lands and railroads.

On the question of building and maintaining highway bridges over drainage ditches we find that the laws of various States differ as to whether the drainage district or the county shall be responsible for the expense. The majority of State drainage laws provide that necessary highway bridges shall be built and maintained by the drainage district. North Carolina and North Dakota specify that while the drainage district shall build the bridges the county or township shall maintain them. Illinois, Iowa, Mississippi, Nevada, Tennessee, and West Virginia specify that the county shall build and maintain the bridges over drainage ditches. There are many

court decisions bearing on this point, but they are not all of the same tenor. The common-law rule was that "ordinarily it was the duty of the county to erect and repair bridges, but where a highway was crossed or cut for any purpose by other than highway authorities it was the duty of those interfering with the road to restore the same." This rule seems to have been quite generally followed by our courts, especially where the crossing was not over a natural watercourse. As in all other disputed points, each district must be guided in this matter by the advice of its attorneys.

ASSESSMENT OF IRRIGATION CANALS.

Irrigation enterprises are of many kinds and the nature of the proprietorship is so varied that the application of the basic principles must be worked out for each case. In general the fundamental factors of special benefits, relief from responsibility, increased efficiency and decreased maintenance will apply.

ASSESSMENTS WITHOUT USUAL BENEFITS.

There are some cases in which assessments not based upon actual benefits as ordinarily understood can be levied.

One of these is where the organization of a proposed drainage district is abandoned. In some States the expenses so incurred may be prorated against all of the lands in the district, while in other States such expenses are paid by the petitioners. Also, a preliminary tax levied by a drainage district for the purpose of paying the expenses of ascertaining the best methods of reclamation need not be based on special benefits accruing from the completed work.

DAMAGES TO AGRICULTURAL LANDS.

If the drainage district authorities, in exercising the power of eminent domain in the discharge of the duties imposed upon them, injure any property, through necessity and not negligence, the property owners affected are entitled to adequate compensation for such injury or taking of property. Such compensation must come from the drainage district, but if the injury arises from negligence on the part of the drainage officials, they and not the district, are responsible. However, when the police power is being used and certain damages are inflicted, the courts of some States have held that the district, or it agents, is not responsible. This is because the public good secured through the exercise of the police power by a governmental agency is considered to be paramount to any injury to individuals caused by the improvement. This discussion is limited to those damages which, generally, must be considered in organizing a district and which are generally held to fall under the power of eminent domain.

All States have made provision for the determination and payment of such damages. The usual practice is for the property owner to claim such damages as he thinks he is entitled to, and this claim is acted upon by a board, usually the same board which assesses the benefits. This board fixes the amount of damages which seems just and reports its findings to the proper authority by whom the report is subject to review. In appeals from the award of

damages the appellant is usually entitled to a trial before a jury which is not the case in all jurisdictions in appeals from benefit assessments. The statutes of many States provide that a failure to claim damages within the appointed time constitutes a waiver of the claimant's rights.

Benefits and damages, although fixed by the same board, should be determined and reported separately. This is required by the drainage laws of many States and should be the law everywhere. Benefits and damages are separate matters and can be determined with more certainty by considering them separately than by attempting to estimate their combined effect upon the property.

All property is entitled to compensation for injuries inflicted upon it by a drainage district. Farm lands, city lots, and railroads are generally held to be susceptible to damage. In the case of Aldrich *v.* Payne, 106 Iowa, 461; 76 N. W. 812, it was held that a town which owns the fee in its streets is entitled to recover compensation as an individual for injury thereto by the construction of a county drain through them.

The measure of the amount of damage to be awarded is the difference between the market value of the property before and immediately after the construction of the improvement. This includes the value of land taken and the amount of the consequential damages, if any. No consideration should be given to benefits derived from the improvement which causes the injury.

The most common element of damage is that due to the taking of land for the improvement. Where the improvement consists of a tile drain no damages from this cause will obtain; neither can injury be shown where an open ditch is constructed in a natural watercourse. In the case of an open ditch not in a natural watercourse the first thing to do is to fix upon the width of the strip of land to be taken for the ditch. The usual practice is to consider it the width of the ditch, although, where considerable earth has to be put in the spoil banks, this question is more complicated. Where spoil banks are composed only of earth, it is sometimes advisable to pay rent for the ground they occupy for two or three years, as, by the end of that time, they will probably have become so leveled that they can be cultivated and no further injury caused. Where, however, the ditch is to be dug through timber land, it is probably more equitable to buy the land occupied by the banks as well as by the ditch, as timber and earth will be so intermingled in the spoil banks that it will be impossible to level them off for some time to come. The area to be taken having been decided on, the next point to be settled is the price to be paid per acre. This is the market value of land in its undrained condition, which is usually a matter of common knowledge.

A second element of injury sometimes present is the disadvantage caused by cutting off a portion of a tract of land from the rest by an open ditch. Such a ditch may cause two distinct kinds of damage; difficulty of access to the isolated lands and difficulty of cultivating the sometimes small and irregular fields. For the first kind of damages, compensation is usually made in allowing a sum sufficient to build and maintain a bridge or by binding the district

to build and maintain such a bridge. The second is of an intangible sort, as it depends on the size and shape of the fields divided by the ditch and the use made of them. Small and irregular fields are not a great disadvantage on a truck farm but a serious inconvenience to a farmer using machinery. Experience has shown that in a short time landowners along a large ditch will adjust their boundary lines by sales and trades to the line of the ditch. While this may properly affect the amount of damages awarded, it should not be a controlling factor, for the drainage district can not compel a man to trade or sell part of his property to retrieve injury to the whole. The location of a ditch in relation to property lines should receive a great deal of thought from drainage engineers. A ditch when once constructed can not readily be moved, and hence it should be so located as to damage lands through which it runs as little as possible, while conforming to principles of engineering design.

Another element sometimes present is the loss of growing crops on lands used by the district or overflowed during construction. Sometimes a floating dredge holds back water to flood adjoining farm land. In such locations the value of the crop damaged should be paid. The district is, however, liable only for damages resulting from proper construction, not for any negligence of the drainage commissioners or the contractor.

Another element of damage is where watering places for stock are drained or their use made impracticable. In such cases it seems just to award an amount sufficient to buy and maintain a windmill or, as is sometimes possible in a tile drainage system, to provide a watering place by tapping the tile and piping drainage water to a watering trough.

The question whether or not a drainage district should fence its right of way sometimes arises when damages are being considered. The district is liable for existing fences it destroys and might build new ones in lieu of paying damages for injured fences, but, in the absence of a statutory requirement, a district can not be compelled to fence its right of way.

There may be, in special cases, other items of damage, but those mentioned are the common ones. Most of these are tangible and can be readily evaluated. The total amount awarded must be equal to the difference in market value of the tract before and after the improvement without regard to benefits derived from the improvement.

In many States, after both damages and assessments based on benefits have been determined, they can be set off against each other. A number of courts have held that subtracting from the assessment for benefit an amount equal to the damages awarded constitutes compensation within the meaning of the term as it is used in the Constitution. Some States do not follow this rule. Nebraska courts hold that the landowner must be paid cash for consequential damages unless action is taken in court, when excess of benefits above the assessment may be offset against consequential damages. A number of courts hold that where land is taken it must be paid for, but where consequential damages are awarded they may be offset against benefits. The courts usually require, where the damages exceed benefits or where cash payments are required, that they must be paid or provision made for paying before the taking or injuring of the land may be begun.

The probable amount of damages which will be inflicted must be determined before a district can be established. To establish a district it is necessary to show that the total benefits will exceed the total costs, and as damages to the property are a part of the costs, at times a considerable part, they should be determined at the earliest possible moment, certainly before final order of assessment is made.

When the amount of damages has been agreed upon by all parties or fixed by the courts, no further damages arising from the same work can be secured unless negligence be shown. Thus the fact that trees were so felled in constructing a drain as to damage the owner's remaining land does not give him a right of action for such damages after his damages have been awarded unless the work was negligently done. (Beaufort County Lumber Co. *v.* Drainage Commissioners 94 S. E. 457). But it was decided in Nicholson *v.* Inlet Swamp Drainage District, 117 N. E. 445, that a drainage district, whose plans for ditch enlargement allowed insufficient slope to prevent caving in of the banks, was liable for material deposited on plaintiff's land by an independent contractor while dredging the caved-in material from the ditch. In Beschulve *v.* Elkhorn River Drainage District 167 N. W. 730, it was held that the grantor of a right of way, releasing the district from all damages from the use of lands, may recover damages caused by carelessness or negligence in constructing the improvement, as the release relates only to damages from proper construction.

In regard to damages arising after the improvement is completed, and caused by extraordinary storms or by defects in the drainage system, the Illinois Supreme Court has held in Thompson *v.* Hughes, 121 N. E. 387 (quoting from the syllabus):

> If drains were constructed properly, with aid of experienced engineers, and were such as reasonably prudent men would have built, and no defects had come to the commissioners' knowledge, or could have been discovered by reasonable diligence, they were not liable to a property owner for damage from overflow.

The remedy under some statutes for insufficient drainage is found not in damages but by compelling the commissioners to provide sufficient drainage. This is shown by the decision in the case of Stoddard *v.* Keefe et al. (No. 11089, Supreme Court of Illinois, April 19, 1917), 116 N. E. 193, where the court said in part:

> We have repeatedly held that where the landowners of a district have been assessed and taxed for the construction of drains and ditches for their lands and the ditches or drains as constructed have proven inadequate for the purpose for which they were intended, the landowners have a right to require the commissioners to adopt and construct a system of drainage which will provide main outlets of ample capacity to take care of the waters of the district; also, if the system of drainage adopted is not of sufficient capacity to afford proper drainage for all the lands of the district, that the commissioners may be compelled, by mandamus, to deepen and widen the outlet or otherwise improve the same so as to afford adequate drainage for the lands of the district if it can be done at a cost not exceeding the benefits accruing to the lands in the district.

METHODS OF MAKING ASSESSMENTS.

Extensive field investigations which have been carried on for some time by the Bureau of Public Roads show that the methods actually used in determining assessments may be divided into three general

classes, one called the "percentage" method, one known as the "classification" method, and the third which may be called the "actual value of the benefits" method.

The first method recognizes that the amount of benefit to be received by each tract depends upon the physical features which affect its drainage properties and seeks to evaluate in percentages the effect of each one of such features upon the amount of the benefits. The second method divides the lands of the district into classes, depending on the relative amount of benefit received by each. The third method determines the value in dollars and cents of the benefits conferred and apportions the costs in accordance therewith.

In some States the statutes prescribe which one of these methods shall be used, while in other States the choice of method to be used is left to the assessing board. The position of the courts is that while the method of determining the actual benefits is the best they will not prohibit the use of some other method so long as it seems fair and is not in conflict with the statutes. The courts are concerned with the relative amount of the assessment rather than with the means used to arrive at that amount. The report of the assessors is looked upon in much the same way as a verdict of a jury. Some courts say that the provisions of the statute in regard to the methods to be used are advisory only. So long as the assessment is not unreasonable the courts will not question the methods used by the assessors. However, except under exceptional circumstances, and then only on the advice of counsel, the assessors should follow the wording as well as the spirit of the statutory provisions.

Each of the three methods is described in some detail in the following sections.

THE PERCENTAGE METHOD.

This method is evidently the invention of an engineer with an analytical mind who realized that the benefits derived by any tract of land depended upon the conditions affecting the drainage features of the land, and sought to evaluate each of the factors going to make up those conditions and thus establish a rule for making assessments so that in any case the assessments could be found by an application of the rule in much the same way that municipal improvement assessments are determined by the "front-foot" rule. It is evident that the equity of any assessment made by such a rule depends entirely upon the correctness of the values assigned to each of the factors which affect the drainage conditions of the land since these in turn determine the benefits. The use of this method is not required by any State.

In most percentage methods the first step is the division of all the land into classes according to their need of drainage, and the assignment of a percentage value to each class. The second step is a further division of the lands according to their proximity to the improvement and the assignment of a percentage value to each division. Next the value of any extraordinary benefits, such as increased ease of access, special flood protection, or the construction of a drain in lieu of an open ditch, is evaluated in dollars and cents. Following these steps, the actual assessment is determined by multiplying the acreage in each "need-of-drainage" class, by the percentage assigned

to that class. The result is again multiplied by the percentage fixed for its "proximity" classification which gives what is called a "product." The "products" are all added together. The sum of the extraordinary benefits is subtracted from the total cost of the work, and the remainder is divided by the sum of the "products" which gives a money value for the unit "product." This unit value multiplied by the number of units in each "product" gives the base assessment for each tract. The extraordinary benefit assessment, as found above, is then added to the base assessment to obtain the total assessment against each tract.

Some engineers have elaborated the above system by separating the first two factors into their elements with still other percentage values, but as the foundation of this system is the value assigned to the various factors, these refinements do not make the system any more equitable and only add confusing complications.

The first step, then, in making an assessment by this method is to divide the lands into classes according to their condition or need of drainage. To do this correctly every physical feature or condition, every advantage, either natural, artificial or as a matter of law, which affects the drainage of the tract must be considered. The field investigations in States using this system showed that it was the almost universal custom to divide the lands into four classes, known as "swamp," "wet," "low" and "high."

Following this, percentages are assigned to each of the four classes and those used, almost without exception, are 100 for "swamp," 70 for "wet," 30 for "low," and 5 for "high." That is, while theoretically each board of assessors fixes its own values for each class, in practice the same values are used in many localities with widely different drainage conditions. The effect of this evaluation is to establish as a fact that "wet" land receives 70 per cent of the benefit received by "swamp" land, and that "low" land receives 30 per cent and "high" land 5 per cent of that benefit. This is an arbitrary assumption and is without foundation in fact. It is possible that, at some particular time and for some particular lands, this proportion was correct, but it obviously can not be true for all drainage districts at all times. The conditions surrounding each tract in most districts vary so greatly that it is impossible to prove that where an acre of "swamp" land receives a benefit from drainage of $100, an acre of "wet" land will always receive a benefit of $70 solely because it is classified as "wet" land. In fact, almost every drainage engineer can recall drainage districts in which the proper relation between the resulting benefits would be more correctly expressed by reversing this ratio.

Again, there must necessarily be a wide variation in the nature of the land classified as "swamp," "wet," and "low," in various districts. In each district the wettest land will naturally be placed in the "swamp" class, with the next wettest in the "wet" class. In one district the "swamp" land may be land which is always under water while in others it may be land which is overflowed at intervals or land which is dry enough to produce good crops of hay. How can it be established that the relative benefits between these various degrees of "swamp" land and the various lands called "wet," "low," and "high" will always be 100, 70, 30, and 5? It is clear that

such a definite unchangeable relation does not exist. In order that an equitable assessment may be made under this system it is absolutely necessary that it be varied for each district by using the number of classes indicated by the drainage conditions, which may be greater or less than four, and by determining anew the valuation to be placed on each class.

If an equal amount of drainage was furnished for each tract, the classification as given above would be all that was required to arrive at the assessment. As it usually is impossible to give each tract equal drainage it is necessary to make some additions to or subtractions from this classification. The second subdivision, then, is made on the basis of proximity to the improvement, the lands being divided into classes according to their distance from the improvement and certain percentages are assigned to each class. The investigations showed that these values varied somewhat according to the size of the district and the completeness of the drainage furnished, but in the great majority of districts examined the percentage values used were as follows:

	Per cent
Lands lying on the improvement	100
Lands lying ¼ mile from improvement	75
Lands lying ½ mile from improvement	50
Lands lying ¾ mile from improvement	25
Lands lying 1 mile from improvement	5

The purpose of this subdivision is to take into account the disadvantage which a tract of land suffers because of being at a distance from the outlet provided by the district. This disadvantage is always a certain sum of money equal to the cost of the lateral drain which is necessary to connect the tract with the district improvement plus a reasonable profit, to be derived from this investment. The cost of this lateral drain depends on the distance, on the amount of fall available, on the depth of the required lateral drain, and on the amount of water to be carried. This cost of the lateral drain can be determined in a very few minutes from the information usually given on the drainage map of the district. It is safe to say that only in a very few instances will the amounts be the same for any two tracts in the same district, but investigation has shown that the same percentage values are quite generally used in many districts with widely different drainage conditions. Again, since this disadvantage is a certain sum of money, the owner is entitled to that amount and no more, and this amount is independent of the cost of the district improvement, the size of the drainage district, the completeness of the protection afforded or the quality of the work done by the district. Yet, under this system, the owner whose land lies one-half mile from the improvement will receive a 50 per cent reduction on his assessment based upon the drainage needs of his land and the cost of the work. Now, if the improvement be an open ditch and cost $10,000 he will receive a certain reduction, but if it be a tile drainage system and cost $50,000 his reduction will be five times as great, all other things being equal, while his disadvantage of location remains the same in both cases. There appears to be very little foundation in reason for the use of a percentage system in evaluating this disadvantage. The use of the same percentage values by so many engineers is due to the fact

that it is almost impossible, if not entirely impossible, for anyone to determine for himself what these percentages should be for any given district.

The third step in fixing the assessments by this method is the evaluation of the benefit derived because of extraordinary benefits, such as that due to a tile drain crossing a tract of land. The usual method of allowing for this benefit was found to be the assessment of a sum equal to the cost of laying a 6-inch drain in the same place. When used with this system this method is probably as good as any that could be used but it does not conform to the theory of benefits. There are similar methods of taking care of other extraordinary benefits.

To make a just assessment it is necessary that this system be modified, in most districts, by the consideration of several important factors which appear to have been neglected in many districts. Possibly the most important of these is what may be called the "effect of the improvement." Few drainage improvements are constructed large enough to take care of the greatest possible rainfalls. The resulting great floods do not affect all of the land in the district in the same way nor to the same degree. "Swamp" lands are usually the worst sufferers, and in some cases this hazard has proven so great that the condition of the "Swamp" lands is little better than before the improvement was constructed. Some place in this system the probable effect of the improvement should be taken into consideration, for data are now generally available which enable engineers to predict how often and to what extent the capacity of the improvement will be exceeded.

Similarly, the effectiveness of the outlet should be considered since it is not always that a perfect outlet can be obtained. The lands at the lower end of the district are usually the ones which suffer most from this cause.

Possibly the greatest objection which can be lodged against this method of making assessments is that it is very complicated and cumbersome. The evaluation of proportionate benefits in per cents and percentages of per cents is very confusing to the ordinary mind. All of these quantities are so indefinite and the whole process so complicated that it is impossible for the commissioners, should they desire to make a change in any of these established percentages, to know what the effect of such a change will be until after all of the field work and computations have been completed. In order to do justice to all, the commissioners should know at all times just what they are doing—that is, they should know the effect in dollars and cents of any classifications they may make, since the assessment must stand upon its equity as shown by its amount in dollars and cents, and not in per cents. As a matter of fact, this system is so complicated that in the general case the board of assessors does not attempt to understand it. Investigations show that the general practice is for the board and the engineer to go upon the lands and classify them according to their need for drainage into the four classes. The engineer then takes this classification into his office and using the various percentages which are in such general use, after some days or weeks spent in figuring, he finally arrives at the assessments as they are reported to the court. That is to say, the complications of

this system have resulted in the assessments being largely the work of the engineer, as the only place where the judgment of the assessors is asked or required is in the classification of the lands. A gentleman who has served as a viewer for some 30 districts said that he has no idea whatever of the various systems used by any of the engineers who had computed the assessments for these various districts. It is obvious that no one except a trained mathematician can know very much about such a system. So in practice this system becomes largely the work of the engineer instead of the whole board of viewers and deprives the landholders of the judgment of the whole board to which they are entitled.

The field investigations upon which this bulletin is based failed to show that better results were obtained by the use of this complicated percentage system than were obtained by more simple methods in other sections.

THE CLASSIFICATION METHOD.

This method is followed in Delaware, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, and Virginia, where it is required by statute. The statute requirements are very nearly identical, being about as follows:

> In the case of drainage, the degree of wetness of the land, its proximity to the ditch or natural outlet, and the fertility of the soil, shall be considered in determining the amount of benefit it will receive by the construction of the ditch. The land benefited shall be separated into five classes. The land receiving the highest benefit shall be marked "Class A," that receiving the next highest benefit "Class B," that receiving the next highest benefit "Class C," that receiving the next highest benefit "Class D," and that receiving the smallest benefit "Class E." The scale of assessment upon the several classes of land returned by the engineer and viewers shall be in the ratio of 5, 4, 3, 2, and 1; that is to say, as often as 5 mills per acre is assessed against the land in "Class A," four mills per acre shall be assessed against the land in "Class B," three mills per acre in "Class C," 2 mills per acre in "Class D," and 1 mill per acre in "Class E." This shall form the basis of assessment of benefits to the lands for drainage purposes.

The making of an assessment in these States resolves itself into a problem of dividing the lands of the district into five classes in which the relative benefits shall be as 5, 4, 3, 2, and 1. This is a very difficult thing to do, as the boundaries of the various classes must be adjusted until this ratio of relative benefits is obtained. Naturally, the lands of the district divide themselves into more or less distinct classes such as "swamp" or "high," or may be divided by their distance from the improvement, but unless the ratio of benefits between these classes is in fact as required by law, the boundaries of such classes must be juggled until the ratio is approximated. The statutes also give the factors which must be considered and although they do not limit the consideration to these factors, in practice it was found that these are the only ones generally used. It has been pointed out elsewhere in this bulletin that ordinarily the fertility of the soil should not be used. In some of these States provision is made for the creation of more classes in case the conditions warrant their use. So long, however, as the statute provides and establishes the ratios between the various classes, it is doubtful if an increased number of classes will give any relief from the difficulties of making just assessments by this method.

A further objection to this method lies in the fact that it, like the percentage method, is confusing to both viewers and landowners. It is impossible for the viewers to know what effect any change they may desire to make in the classification of a tract of land will have until after the classification and the computations are completed. If the viewers should desire to reduce the assessment of a tract because of its distance from the ditch, the only way this can be done is by decreasing the class of the land, yet it is impossible for them to tell how much in dollars and cents such a reduction will amount to, until after the assessment roll is completed. The case is much the same with the landowners, for under this system the only information that they have as to the amount of their assessments at the time of the final hearing is that there are so many acres in "Class A," so many more in "Class B," and so on. This is entirely wrong, for the landowner is entitled to full knowledge of what the work will probably cost him, that is, how much his assessment will be in dollars and cents, before it too late for him to object to his assessment should he so desire.

The fact that there have been comparatively few appeals made from the assessments in the States using this method is due more to the good judgment exercised by the viewers who have made the assessments, or possibly to the difficulty of showing discrimination or inequalities under the statute, than to any merit in the system.

THE ACTUAL VALUE OF THE BENEFITS METHOD.

The third method which determines the actual values of the benefits conferred and uses them as a basis for the assessments is prescribed by law in some fourteen States and is employed in a number of others. Briefly, this method determines the increased value of the property due to the improvement and levies such a part of the total increases as will equal the total cost of the work. While not a perfect method, it is to be preferred to all others and its use is strongly recommended wherever the statutes do not forbid.

The strength of this method lies in following out the theory of special assessments according to benefits, which is the basic principle underlying all of our general drainage laws, and followed by the courts. Under this principle the assessments must be based upon special benefits, which have been defined as benefits so distinct and peculiar as to affect the value of the individual tracts. Since the measure of the benefit is the increase in value of the land, no more logical or direct way of carrying out these principles can be suggested than the evaluation of the individual benefits in dollars and cents and using them as a basis for the assessment. This method apportions the costs according to the benefits, while both of the other methods apportion the costs according to arbitrary assumptions as to the effect of physical properties or conditions surrounding the individual tracts upon the relative benefits received by each. It evaluates the benefits rather than indefinite quantities, the assumed influences of physical conditions on the benefits.

Since this plan follows the theory of local assessments it must develop the facts required by any court to justify a special assessment. An assessment roll prepared by this method, when introduced in court, shows on its face and is prima facie evidence of two things

upon which the court must rule. First, that the total benefits will exceed the total costs; second, that the individual assessments and benefits are in the same ratio as the total costs and total benefits. Every court, in considering contested assessments, must consider both benefits and assessments as evaluated in dollars and cents, as that is the only way we can measure value. It is therefore logical for assessors to use that medium in determining benefits and assessments that will be called for when their assessments are questioned in court.

Again, this method is simple and can be readily explained. This is an important consideration; for, as has been said, an assessment not thoroughly understood by landowners is liable to be attacked, and the lack of such understanding may be the cause of large and needless expense to the district. Under some methods of apportioning costs the only information given to the landowner at the time of confirming the apportionment besides a statement that benefits will exceed costs, is that his land has been classified at "76 per cent," or that he has "10 acres in Class A, 20 in Class B," or the like. The owner requires more information than that, to know whether or not the project will be profitable for him, and he is rightfully entitled to full information as to both his benefits and assessments while there is yet time for him to object to his apportionment, should he so desire. Any drainage improvement that should be constructed must be able to show a total benefit much greater than the total cost, and the profitableness of the undertaking can best be shown by reporting actual individual benefits and assessments to the landowners, and to the court, at the time the apportionment comes up for confirmation. This method presents clearly these necessary, fundamental facts.

This method is theoretically applicable to all drainage districts and under all conditions, since every kind and all degrees of special benefits affect the value of the property. It is practically applicable to many different conditions and is more universal in its application than other methods in use. Under some conditions, however, it can not be used. The principal one is where the amount of the benefit is so small in comparsion with the value of the property that it can have no appreciable effect upon the value. Assessments against railroads, highways, and municipalities when assessed as a whole, fall into this class. There are, also, instances of indirect benefits, or of benefits as a matter of law, which belong to this class. These exceptions, because of the elements which make them exceptions to this method, are likewise exceptions to most other methods of making assessments.

While this method is theoretically almost perfect, its use presents some difficulties. To those accustomed to formulas and to the analytical determination of benefits, fixing the amount in a lump sum appears to be full of dangers. Accustomed to systems which confine the judgment of the viewers, they fear that the full play allowed by this method will result in inaccuracies. The fact that this method has been used successfully for years in several States under a variety of conditions, shows that such fears are groundless. Beyond question, the intent of all the statutes is to leave the determination of the benefits to the judgment of the assessors, and any method which

prevents the exercise of such judgment does not accord with the intent of the law.

There are several ways in which this plan may be worked out, and the following brief discussion of one way is given.

As the first step in the determination of the amount of benefit to be received by a tract receiving complete drainage from the proposed improvement, it will be necessary to determine the value of the land before and after drainage is obtained. It is equitable to take the market value of the undrained land as a starting point, while the value of the land when completely drained is comparable with the market value of lands in the vicinity artificially or naturally well drained. There are cases where the market value of undrained lands should not be used. For example, it is frequently found that where the cost of drainage is known the undrained land is held at a speculative price equal to the value of the adjoining drained land less the cost of drainage, thus including in the price the benefits to be derived by drainage. In such cases the value of the undrained land may be determined as the value before the drainage movement was started, or it may be computed by capitalizing the annual earning power of the undrained lands. It should be borne in mind that fertile soils are of more value when undrained than poor soils, so as to give the owner credit for any advantage in this respect. The exact method to be followed must be determined by the facts and conditions in each case.

In considering lands which are partially drained, either naturally or artificially, before the construction of the district improvement, if the market value of such lands is not known or is speculative, they may be first valued as though undrained and an addition to their value made in the amount of the capitalized annual profits due to their drainage facilities.

The value of the reclaimed lands can usually be taken as equal to the market value of the adjacent highlands, not including buildings or other improvements and bearing in mind that reclaimed bottom or swamp lands are often more valuable than adjacent high land.

In large districts it may be well to establish basic values for different types of land to make sure that the assessors' ideas of value do not change as their work progresses. Such basic values should be changed in considering individual tracts in such manner as conditions warrant.

The difference in the value of the land before and after complete drainage will generally comprise all benefits which the land will receive, including those due to improved agricultural conditions, increased accessibility, and improved health conditions.

When the difference in the value of the land before and after complete drainage has been fixed, reductions will become necessary as it usually is not possible to drain completely all land in the district. If the land be such that tile drains at regular intervals are necessary to give the tract complete drainage, and such tile drainage systems are not to be installed by the district, a reduction must be made in the benefits. This reduction should be equal to the benefit which will result from such additional drains. While the reduction is ordinarily based upon the cost of the additional work, it must include a sum sufficient to make the total equal to the benefits to be derived from

such work. One method of arriving at the reduction is to assume that the same ratio exists between cost and benefits of this additional work as exists between the cost and benefits of the work to be done by the district. Thus, if the total benefits of the district are three times the cost of the district improvement, the individual benefits as determined for complete drainage should be reduced by a sum equal to three times the cost of any work which must be done by the owner to secure complete drainage.

In the same way deductions can be computed for the disadvantage suffered by a tract which lies at a distance from the outlet furnished by the district.

Where the land is subjected to a hazard due to insufficient size of drain or poor outlet, the benefits determined should be reduced by an amount based upon the estimated time during which the land will be overflowed and the extent of the injuries from such overflow.

In case a tile drain is laid in an open ditch or natural watercourse the additional benefit due to this would be equal to the drained value of the newly made land.

If it is desired to find the amount of additional benefit due to a ditch or tile drain crossing a tract of land, the difference in value between the completely drained strip and the rest of the tract should be determined and added to the benefits found for the entire tract. Where there is variation in the porosity of the soils within the district, the width of the strip so drained should be considered as that of the most impervious soil.

If conditions be such that it is advisable to make each lateral or other section of the improvement an assessment subdistrict, it can be done by apportioning the costs of the subdistrict, plus a proportional part of the outlet costs, among the lands affected by the lateral according to their several benefits.

The following form has been used with success for some years in Wisconsin:

Parcel No. _____. No. of acres _____. Owner _____
Township _____. Range _____. Section _____
Fall to ditch No. _____, _____ feet.
Acres wet land _____. Acres medium _____. Acres high _____
Soil _____

	Dollars.
Present value per acre of wet land	
Improved value per acre of wet land	
Total improved value of wet land	
Total present value of wet land	
Gross benefits to wet land	
Allow for drains already constructed	
Allow for outlet	
Allow for	
Net benefits to wet land	
Present value per acre of medium land	
Improved value per acre of medium land	
Total improved value per acre of medium land	
Total present value per acre of medium land	
Gross benefits to medium land	
Allow for drains already constructed	
Allow for outlet	
Allow for	
Special benefits to dry land	
Nature of special benefits to dry land	

SUMMARY.

	Dollars.
Net benefits to wet land	
Net benefits to medium land	
Special benefits to dry land	
Additional charge for distance from the outlet	
Additional charge for tile in place of open ditch	
Total assessed benefits	

DAMAGES.

	Dollars.
Square rods taken for main ditch	
Square rods taken for lateral ditch	
Square rods taken for spoil bank	
Total value for land taken	
Rental value of spoil bank for ____ year	
Allow for cutting fields	
Allow for bridges	
Allow for	
Total allowances	
Total damages	

REMARKS.

"Wet land" includes all land not tillable in its present state in any average season.

"Medium land" includes all land which is tillable in any average season, but which can not be tilled in a wet season.

"Dry land" includes all land not found in the first two classes but included within the drainage district.

"Present value" means the actual market value of the land in question taken by itself, not its average value as a part of the farm to which it belongs.

"Improved value" means the actual market value of the land in question taken by itself after the drainage system is completed and the land tile-drained and other drainage improvements made as allowed for on the assessment sheet.

"Outlet" means an allowance given to land which is not given an outlet into the ditches for which the assessment is made. This allowance is equal to the cost of constructing a tile drain for that purpose.

"Additional charge for tile in place of open ditch" is used where the improvement is partly open ditch and partly tile and is equal in amount to the cost of the tile over the cost of the open ditch.

"Special benefits to dry land" are benefits to health, convenience, and welfare. In one district (in 1916) these special benefits were assumed to be $1 per acre.

The space occupied by the spoil banks is either purchased outright or rented for a term, usually two years. The cost of leveling the spoil banks is usually allowed in the case of dredged ditches when the land is not purchased. The usual allowance for this is 25 cents per linear rod for each bank.

The total cost of the work is determined from the engineer's estimates, and such part of the benefits are assessed as will equal the total cost of the work.

This form is useful because it shows on its face many of the elements of benefit which must be considered by the commissioners. In using such a form, care must be taken to give full consideration to those things which necessarily determine the two values of the land, such as the drainage properties of the undrained land and the amount of drainage or protection furnished by the district.

The dividing of the land into classes is a practice to be used with caution. If used only to insure that the commissioners' ideas of

land values do not change during the making of the assessment it is properly used, but if it tends to avoid individual consideration of each tract, which is absolutely necessary to just assessments, its use should be discontinued. It probably is good practice for commissioners, early in their work, to distinguish such classes as clearly as possible and to use this classification as a basis for further consideration, modifying it as the physical characteristics, drainage features, and protection afforded each individual tract may require.

In using this form it is assumed that each tract is given complete drainage; where such is not the case a deduction equal to the cost of completing the drainage is made from the gross benefits. This practice does not seem to be entirely correct. The cost of completing the drainage will be a certain sum, while the benefits derived from such additional work will be another, usually very much larger, sum. The owner is entitled to a deduction equal to the benefit he will receive from this additional work rather than the cost of such work. Under this form the drainage district appropriates all of the benefit which will accrue from such individual work as will have to be done by the landowner, and, if the drainage district gets into financial difficulties, the owner can be forced to pay any amount up to the total benefits which will accrue including those due to the additional work done by himself.

Under this form, where tile drains are laid across a tract of land or an open ditch is replaced by a tile drain, the cost of that part of the work is added to the benefits which have been fixed for that tract. For the same reasons as are set forth above, the benefit to be derived from this part of the work should be added to such other benefits as the tract may receive. By so doing, the district will receive full credit for the benefits which it creates. Likewise, where use is made of ditches or drains already constructed, the amount allowed for them should be equal to the benefit derived from them instead of being made equal to their cost. Benefits and costs can not be added to or subtracted from each other.

The item "Additional charge for distance from the outlet" is probably rightfully considered in this State, because Wisconsin follows the common-enemy rule of surface waters. In jurisdictions which follow the civil-law rule such a charge has been declared unreasonable and illegal. The following form is provided in Missouri by the general drainage law for the use of the commissioners in making their report to the court.

Owner.	Description.	Number of acres assessed.	Amount of benefits assessed.	Number of acres taken for right way.	Value of property taken.	Damages.
					Dollars.	*Dollars.*

It is impossible to cover all contingencies and special conditions arising in assessment work. The suggestions given illustrate one way of applying this method. Conditions and careful thought

on the part of the assessors must determine details in each particular case.

Of the methods of apportioning assessments now in use a number are made on an arbitrary basis dealing with indefinite and indeterminate quantities; they are cumbersome and complicated; and some of them are not in accord with the principles of local assessments and are, therefore, likely to result in unjust and inequitable assessments. There is ample room for the improvement of method, and the necessity for such improvement is shown by the litigation which too often accompanies the organization of drainage districts. The apportionment of assessments according to the benefits received is the best method of taxation which has been devised. The justice of assessments based upon benefits has been thoroughly established. All that is needed to make such assessments as perfect as anything can be into which enters the judgment of man with its liability to error, is to perfect methods of apportionment. To the end that drainage assessments may be more firmly established upon true principles, it is recommended that the individual benefits which will accrue be evaluated by the assessors in dollars and cents, and that the costs be apportioned to such benefits.

ORGANIZATION OF THE UNITED STATES DEPARTMENT OF AGRICULTURE.

December 20, 1923.

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